▶ VSAT NETS

1st user eyes $2m savings

BY BOB WALLACE
Senior Writer

LOS ANGELES — The first user of an Equatorial Communications Co. private very small aperture terminal (Vsat) network expects to save $2 million during the first year of operation.

Tired of waiting for new lines to be installed, Farmers Insurance Group is dumping its 200-line leased-line network. In April, it shelled out $30 million to the Mountain View, Calif.-based Equatorial for its 3,000-site, two-way Vsat network. Farmers Insurance became Equatorial's first private Vsat network customer.

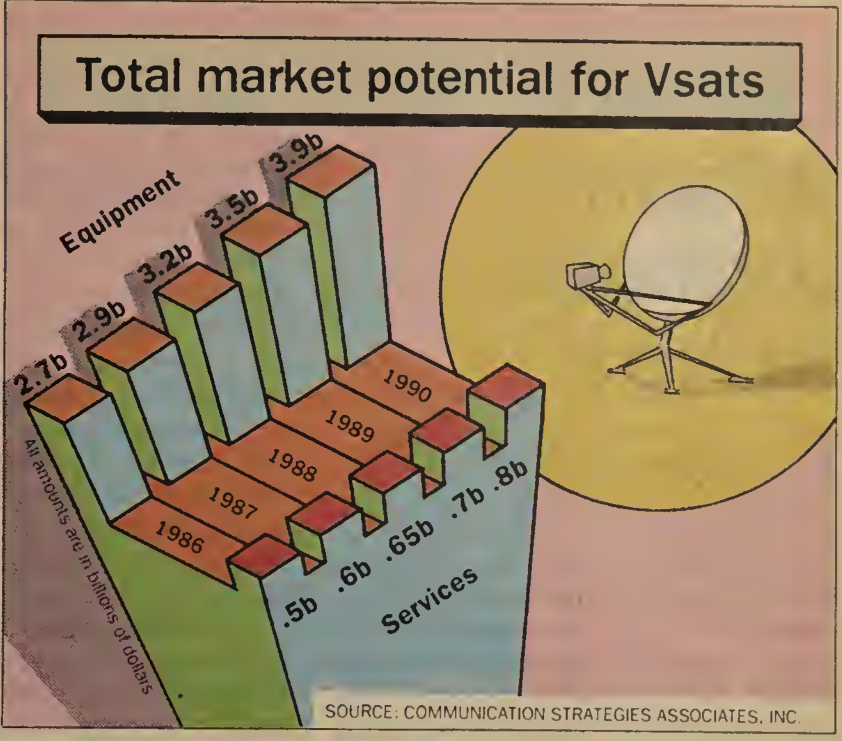
The Vsat network is aimed at solving a problem that had been nagging agents at the company's remote offices. Because of delays in obtaining leased lines, Farmers had been forced, in many instances, to connect as many as 20 agents to a single 4.8K bit/sec multidrop leased line. That situation led to extremely long response times.

Equatorial provided Farmers with a C-200 micro earth station for each of its remote locations and three channels on an Equatorial-owned satellite transponder aboard Western Union Corp.'s Westar V satellite.

Ed Terhar, vice-president of systems

Continued on page 68

Total market potential for Vsats



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NETWORK WORLD
THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 4 MARCH 31, 1986

▶ PC NETWORKS

Virtual nets laid bare

BY JOHN DIX
Senior Editor

In three to five years, users of personal computers will be able to reach through their microcomputers and pluck information from other local network clusters, office systems and mainframes as easily and transparently as if that data were in the box on their desk.

At least, that's the goal of virtual networking.

"We're all moving now to offer that kind of capability," explains Roselie Buonauro,

☞Continued on page 63

▶ PHONE COMPANIES

Private line backlog relief?

Revamped system to trim installation time bows today at AT&T, BOCs

BY JOHN DIX
Senior Editor

LIVINGSTON, N.J. — A modified system that will streamline order handling and reduce the waiting period for private-line installation is scheduled to go on-line today at AT&T Communications, Inc. and five of the seven regional Bell operating companies.

First developed by Bell Communications Research, Inc. in December 1984, the Access Request Information System (Aris) establishes a common way for carriers to store and track orders and specifies standard codes for billing and provisioning — the process of installing the link.

Long-haul carriers building end-to-end circuits for customers submit orders in an Aris format for the local links needed. These orders can be submitted in batch mode directly from a long-haul carrier's host computer, from a terminal or as a paper invoice, according to Bud Blanton, Aris project

Continued on page 8

NETWORK LINE

News

Timeplex and US Telecom struck a joint deal to offer T-1 products. Page 2.

▼

3Com's investment advisors abruptly called off its pending merger with Convergent Technologies at the eleventh hour. Page 2.

▼

M/A-Com expects a first-quarter loss of $45 million to $55 million. Page 2.

NEWSPAPER

The concept of office automation was pronounced dead at the OAC '86 show in Houston. Page 3.

▼

Metropolitan networks are starting to catch on in wide-area environments. Page 4.

▼

Features

The proliferation of fiber-optic networks isn't all it's cracked up to be. Page 58.

▼

The integrated voice/data PBX product focus takes a hard look at these very big-ticket items. Page 65.

▶ INTERFACE '86

X.25 shines at show

BY JOHN DIX
Senior Editor

Change was in the air at last week's Interface '86 communications conference, demonstrated by the fact that AT&T Information Systems and AT&T Communications, Inc. were displaying together. It was the first time the operating units have publicly joined forces since regulatory restrictions that required them to operate at arm's length were lifted. Amid the usual slew of modem and multiplexer announcements (see story on Page 3), more than 10 companies debuted products related to X.25 packet-switching and packet net services.

Continued on page 68

▶ MERGERS

3Com dumps suitor

BY SHARON SCULLY
Senior Editor

SAN JOSE, Calif. — In a surprise development, Convergent Technologies, Inc. and 3Com Corp. last week scrapped a four-month-old merger plan, following a last-minute decision by 3Com's investment advisors not to sanction the pending $135-million deal.

3Com's investment bankers, Robertson, Colman & Stephens, withdrew their opinion that the merger, as described in a prospectus statement, was "fair to the shareholders of 3Com." The companies met following the bankers' eleventh-hour decision, but were unable to settle on an accord more favorable to 3Com stockholders. The companies then mutually terminated the agreement.

According to the original prospectus, Convergent would have been the surviving company. The merger would have combined the minicomputer and desktop computer manufacturing operations of Convergent and the local-area networking business of 3Com into one entity. Both Silicon Valley start-ups were founded in 1979 and have been successful in both OEM and end-user markets.

The combined company was to have been headed by Robert C. Ely Jr., now president and chief executive officer of Convergent, as chairman and chief executive officer, and 3Com President L. William Krause, as chief operating officer and president. Both men were formerly executives with Hewlett-Packard Co., the company that employed six of the eight members of the combined company's planned management team. 3Com founder Robert Metcalfe, who holds the patent for Ethernet technology, was to have been senior vice-president of the merged company.

Executives of both companies said they were surprised and disappointed by the bankers' abrupt decision, which came only one day before a scheduled shareholder vote was expected to rubber-stamp the agreement.

In a negative financial forecast the previous week, Convergent estimated first-quarter revenue would be between $70 million and $80 million, down about $22 million from the year earlier. The company also said net earnings per share for its first quarter would be between break-even and five cents a share, compared with year-earlier earnings per share of one cent on $206,000 profit. 3Com, on the other hand, reported record earnings of 13¢ per share for its third quarter, ending Feb. 28, according to a 3Com spokesman.

The original terms had called for Convergent to pay one common

Continued on **page 6**

▶ INDUSTRY

M/A-Com predicts $45m quarterly loss

BY SHARON SCULLY
Senior Editor

BURLINGTON, Mass. — M/A-Com, Inc. last week said it anticipates an after-tax loss of between $45 million and $55 million for its second quarter, which ended March 29.

At the same time, the company said it had retained the New York investment banking firm Salomon Brothers, Inc. to assist management in the "evaluation of restructuring alternatives" designed to "refocus the company's resources and streamline its operations."

The company's restructuring could include the spin-off of certain operations. But Joseph Bothwell, M/A-Com's senior vice-president of corporate development, said he would not comment on specifics of the restructuring before it has been reviewed by the company's board of directors. The review is expected to take place in early May.

M/A-Com's primary business areas include digital business communications, home and cable television communications and semiconductors and components. The company said that the expected second-quarter loss could include write-downs of inventories, losses

Continued on **page 8**

▶ SERVICE INTEGRATION

Timeplex, US Telecom in T-1 Team

BY BOB WALLACE
Senior Writer

Timeplex, Inc. and US Telecom Data Communications Co. last week joined forces to offer users a single source for T-1 digital lines, multiplexing equipment and network maintenance services.

Under the pact, Timeplex will be able to market its multiplexers with US Telecom's T-1 services, offering end-to-end service that includes management and control of the customer premises multiplexing equipment.

The agreement also calls for US Telecom to upgrade its existing Uninet, Inc. public data network transmission rates from 56K bit/sec to 1.544M bit/sec, using Timeplex's Link/1 T-1 multiplexers. The use of Timeplex equipment in this network will enable US Telecom to provide sub-T-1 digital circuits to end users in less than 30 working days.

US Telecom's ability to provide users with digital lines quickly may allow the carrier to lure data service customers away from AT&T Communications, Inc. Timeplex's Link/1 Facilities Management System is a key ingredient in the combined efforts. The equipment enables either US Telecom or Timeplex to manage end-to-end facilities or to readily offer customers sub-T-1 digital communications links.

US Telecom's parent company, US Telecom Communications Co., already has 4,700 operational fiber-optic route miles. US Telecom Communications plans to have 16,000 miles of the planned 23,000 total network completed by year end.

Bill Reed, a senior analyst with New York-based Link Resources Corp., said the US Telecom-Timeplex telecommunications tandem will make life easier for network planners. He said it would do this by offering them digital facilities and related customer premises equipment in one package.

"I don't think the announcement will jolt the data services marketplace, but it will make users think about acquiring facilities from carriers other than [AT&T Communications]," he predicted.

Reed claimed the joint marketing agreement is a marketing ploy by US Telecom to help create awareness and usage of its fiber-optic network.

"US Telecom is an established carrier, but their network really isn't well-known at this time," he said.

Howard Stern, market development director for US Telecom, said the company evaluated a number of T-1 equipment vendors before reaching the agreement with Timeplex.

"The criteria for the decision included the technical efficacy of the product, the stability of the company and whether the company would be a viable joint marketing candidate."

Table of contents

TOP NEWS

Bellcore system may cut leased-line delays. **Page 1.**

First user of Vsat net plans big savings. **Page 1.**

Plethora of X.25 products unwrapped at Interface '86. **Page 1.**

3Com leaves Convergent at the altar. **Page 2.**

T-1 multiplexers make news at Interface '86. **Page 3.**

Apple riding Mac to communications success. **Page 4.**

COS head speaks on standards push. **Page 5.**

Cityplace shared services users seek savior. **Page 6.**

INDUSTRY UPDATE

Nasa shuttle woes slow satellite launches. **Page 9.**

TELECOM TRENDS

Lexitel, Allnet pairing faces tough going. **Page 11.**

DATA DELIVERY

Net management vendors split on strategy. **Page 13.**

FACTORY COMMUNICATIONS

Talking turkey with AT&T's network answer man. **Page 15.**

COMMUNICATIONS MANAGER

Staying close to remote workers. **Page 17.**

OPINIONS

IBM's Token-Ring Network in "The Twilight Zone." **Page 56.**

FEATURES

Focus on voice/data PBXs. **Page 65.**

▶ INTERFACE '86

T-1 multiplexers, products are bountiful at Interface

BY JOHN DIX
Senior Editor

ATLANTA — While packet switching stole much of the spotlight at Interface '86 here last week, T-1 multiplexers and products gave X.25 technology a run for its money.

Hubbing, multiple links, control and management were features that differentiated this product crop from previous T-1 offerings.

Infotron Systems Corp. unveiled a digital cross-connect system called the Infostream 2500 to complement its line of T-1 products. The 2500 can support 12 DS1 interfaces — as used with T-1 1.54M bit/sec digital facilities — and up to three hub configurations.

In use, the 2500 is situated between T-1 multiplexers, enabling individual channels within incoming T-1 links to be routed out over other channels. The 2500 is compatible with AT&T's Accunet 1.5 service and the D4 framing standard, which determines channel configuration within the 1.54M bit/sec digital pipe. Cost for the 2500 ranges from $55,000 to $70,000 for fully redundant systems.

General DataComm Industries, Inc. introduced the Megamux II, a software-controlled T-1 multiplexer that supports up to 16 aggregate links at speeds up to the European T-1 standard of 2.048M bit/sec.

Megamux II supports alternate routing paths and has the ability to assign priority on a channel basis. Configuration and reconfiguration can be downline loaded to remote sites. An Autoframe feature enables formatting of the aggregate bit stream. Pricing for the Megamux II, which will be available in August, starts at $30,000.

International Data Sciences, Inc., of Lincoln, R.I., also unveiled a T-1 multiplexer, playing up the management aspects. The Magnumux is procured under a joint marketing agreement with an undisclosed manufacturer, as are IDS' matrix and A&B switches.

Others introducing T-1 products included Avanti Communications Corp. and Timeplex, Inc.

▶ OAC '86

OAC tolls end of OA era

BY MARY PETROSKY
West Coast Correspondent

HOUSTON — The integration of computer and communications systems — theme of the Office Automation Conference '86 (OAC) held here last week — spells the end of office automation as a technology, OAC's conference chairman told attendees.

"Integration is changing perceptions of office automation," said Bill Carlisle, OAC chairman and assistant vice-president of planning, engineering and small business systems for Bell Communications Research, Inc., Piscataway, N.J.

OA originally referred to standalone office systems, primarily word processors.

But the need to link groups of workers and provide them with access to remote data means that "OA as a technology has come to its useful end," Carlisle said. OA is being subsumed within data processing and is becoming part of the larger realm of information systems.

One result of this shift was evident in the decision to rename the conference.

The American Federation of Information Processing Societies (AFIPS), sponsor of OAC, dubbed it Business Systems and Applications Conference, a reflection of AFIPS's desire to focus on the applications of technology, Carlisle said.

In his remarks, Carlisle recommended that companies develop a master plan for implementing diverse technologies. Corporations that already have a variety of equipment in place may need to install several different networks, he said. Microcomputers have been a major force in reshaping OA, said Rod Canion, president of Compaq Computer Corp. and keynote speaker at the conference.

Canion sees the microcomputer

Continued on **page 69**

Confused about network management?

It's time for some straight talk.

Managing your network means more than just monitoring modems.

Many vendors claim they can sell you a "network management" system:

• Modem companies offer a computer-controlled modem monitor they call "network management." But their goal is to sell more modems.

• Multiplexer companies and switch manufacturers all have computer-controlled systems they label "network management." But their goal is to sell more muxes and more switches.

• Computer companies sell host and front-end software packages for "network management." Their aim? To sell more computers and more software.

So although *your* main interest is the network as a whole, *theirs* is just the limited part they sold you. While *your* prime task is to manage the entire network, *theirs* is to sell you more equipment — for completely separate pieces of the network. By using the "network management" label, they make their system sound like a total solution. But it's not.

You can't buy a network management system.

Network management is not a machine. It's a way of doing things. It's the policies, the procedures, the automated tools, and the people you've put in place over the years.

You can't *buy* network management — from anybody. Just like business management, you've got to build it — policy by policy, procedure by procedure, tool by tool, and person by person. When you've done that, *then* you're managing your network.

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Sure, all the network management tools are useful, helping monitor, control, and fine-tune various parts of your network. But there's still a big problem: all those separate systems. They don't talk to each other. They don't even use the same control terminals. Today's network operators work with an uncoordinated jumble of CRTs, printers, command languages, databases, and alert logs. The inevitable result is confusion and inefficiency — even in the best-run network control centers.

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▶ OAC '86

Apple targets communications with Macintosh as weapon

BY MARY PETROSKY
West Coast Correspondent

HOUSTON — By exploiting the ease-of-use features of its Macintosh personal computer, Apple Computer, Inc. aims to prosper in the burgeoning data communications product market for small- and medium-sized businesses.

In an interview at the Office Automation Conference (OAC) '86 here last week, Peter Friedman, Apple's desktop communications marketing manager, said Macintosh's graphic interface simplifies end-user communications tasks. "The Macintosh interface is easier to navigate than [Microsoft Corp.'s] MS-DOS," he said.

Friedman said Apple acknowledges IBM's dominance within Fortune 500 companies. So Apple has targeted small- and mid-sized businesses as the primary buyers of what it calls its "desktop communications" products.

"Our objective is not to displace IBM, but to dominate new market segments," he said.

Many of Apple's communications products are focused around Appletalk, Apple's local-area network for Macintosh computers, which was introduced in March 1985.

Approximately 10,000 Appletalk networks were installed by the end of 1985, Friedman said. In an effort to ensure compatibility among Appletalk-oriented products, a group of third-party vendors formed the Appletalk Developers Association last fall. The group, which now has more than 40 member companies, held its third meeting during last week's show.

Several of the third-party communications products Apple showed at OAC are only now becoming available. Scheduled to ship this month, Infosphere, Inc.'s Macserve allows users to employ hard disk drives from a variety of vendors as disk servers for Appletalk.

Other products are due out in April, including Interbridge from Hayes Microcomputer Products, Inc. of Norcross, Ga. Interbridge can connect two local Appletalk networks, or link two remote networks when used in conjunction with a Hayes Smartmodem. Inbox, a messaging and file transfer product from Think Technologies, Inc. of Lexington, Mass., is also slated for April shipment.

Tri-Data Corp. demonstrated enhancements to its Netway 1000A Communications Server, which acts as a gateway between Appletalk and IBM host computers. The enhancements include support of Switcher, an Apple utility that allows users to switch between applications.

Users of Netway can now switch between host sessions and Macintosh applications without breaking contact with the host. ◘

▶ MICRO-MAINFRAME

IBM inks links pact

BY PAUL KORZENIOWSKI
Senior Writer

Before users reach the promised land where facile IBM communications facilities such as Advanced Program-to-Program Communications (APPC) prevail, they will have to pass through a more mundane landscape populated by limited, stand-alone microcomputer-to-mainframe links.

But even while steadfastly working to advance facilities like APPC, IBM is moving in the micro-mainframe communications arena. Two weeks ago, Big Blue quietly presented a series of data reformatting tools that allow users to employ mainframe data in micro applications.

Hidden amidst a plethora of announcements concerning shipment of the IBM Token-Ring Network was notification of a marketing agreement that Big Blue signed with Sterling Software, Inc., a Dallas software firm. The agreement enables IBM to market Sterling's Answer series of micro-to-mainframe software: Answer/DB for Personal Computers, Lotus/Answer and Dbase/Answer.

Answer/DB for Personal Computers allows users to reformat IBM IMS, Vsam and DL/1 files for use with IBM Personal Computer programs. Lotus/Answer reformats for Lotus Development Corp.'s Lotus 1-2-3 and Symphony. Dbase/Answer works with Ashton-Tate's Dbase II, Dbase III and Framework. The Sterling products require additional file transfer software. They work with a number of communications products, including those from Digital Communication Associates, Inc., Forte Data Systems, Inc. and AST Research, Inc.

Although current micro-to-mainframe connections may appear insignificant in the face of emerging technologies like APPC — also known as LU 6.2 — links still present complex problems for many corporations.

"Items like LU 6.2 represent future alternatives," said John McQuillan, president of McQuillan Consulting, Cambridge, Mass. "Currently, there aren't many products that support LU 6.2, so the most common way to link a micro to a mainframe is through an [IBM] 3270 terminal emulation product."

Micro-to-mainframe links have been available for a few years and have not sold as well as some analysts had predicted. Why then did IBM choose to enter a rather lackluster market?

"IBM typically allows other companies to develop a market before entering it," McQuillan noted. "IBM must feel that the microcomputer-

Continued on **page 6**

▶ WIDE-AREA NETWORKING

Metro nets on road to reality

BY MARGIE SEMILOF
Senior Writer

Super high-speed voice, data and video networking schemes that will connect intracity buildings in a campus-like environment are moving closer to becoming viable products. In fact, users may begin to see such metropolitan-area network products emerging as early as this year.

Metro networks are aimed at companies with multiple buildings within a city whose needs may not be met by current local-area network offerings. The technology is currently being tested by a number of vendors using fiber optics as a transmission medium.

Fiber appears to be replacing cable television facilities that were originally thought to be the ultimate metro net medium.

Metro nets differ from their local-area net counterparts in both distance and capacity. Metro-area networks can encompass a 50-km campus, compared with local networks, which average a 2-km operational distance. Currently, metro nets are capable of transmitting data at aggregate rates greater than 44M bit/sec, but network designers are reining in that capability to jibe with the 44M bit/sec common carrier-compatible digital transmission signaling rate.

Continued on **page 68**

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Box 9171, 375 Cochituate Road
Framingham, Mass. 01701-9171
617/879-0700

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Bruce Hoard
Managing Editor
John Gallant
Features Editor
Steve Moore
Associate Editors
Kathleen M. Cahill
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New Products Editor
Jim Brown
Washington, D.C. Correspondent
Karyl Scott
1273 National Press Building
529 14th Street NW
Washington, D.C. 20045
West Coast Correspondent
Mary Petrosky
1060 Marsh Road
Suite C-200
Menlo Park, CA 94025
Assistant Features Editors
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▶ STANDARDS

COS chief speaks on integration

In less than three months, the Corporation for Open Systems (COS) has garnered support from some 40 key organizations, including IBM, Digital Equipment Corp., Apple Computer, Inc. and General Motors Corp.

COS was spawned by key members of the Computer and Communications Industry Association (CCIA), a consortium of vendors. A.G.W. Biddle, president and executive director of CCIA, played a key role in the formation of COS.

Network World *senior writer Paul Korzeniowski recently interviewed Biddle.*

How did the idea of COS originate?
At the annual CCIA presidents' meeting two years ago, a six-member team was formed to examine the issue of connectivity. The task force concluded that an organization like COS was needed and that success required a broad representation of users as well as vendors.

What tests will COS supply for the layers of the International Standards Organization's (ISO) Open Systems Interconnect (OSI) model, and how will COS validate vendors' equipment?
The intent is to develop, or contract out to be developed, comprehensive test suites [test specifications] to evaluate a product's conformance to specifications for each of the seven layers. A product should operate with another product tested against the same suite. COS does not intend to be in the test services business but rather, to see that tests are developed and verified. As soon as [products] are debugged and documented, COS would license them to testing companies or to vendors for self-testing.

Is a test suite simply a set of

Continued on **page 69**

▶ NETWORK OPTIONS

Test kits swing Vsat deals

BY BOB WALLACE
Senior Writer

It's not unusual for Comsat Technology Products, Inc. to haul a 6.1-meter earth station onto a user's premises in an effort to close a very small aperture terminal (Vsat) network sale.

The Clarksburg, Md.-based company is one of a growing number of satellite equipment vendors that spur sales by using starter kits and pilot programs. The marketing ploys allow potential customers to sample the fledgling Vsat technology. Comsat connects its portable hub unit to several smaller Vsat units to give users a private Vsat network demonstration.

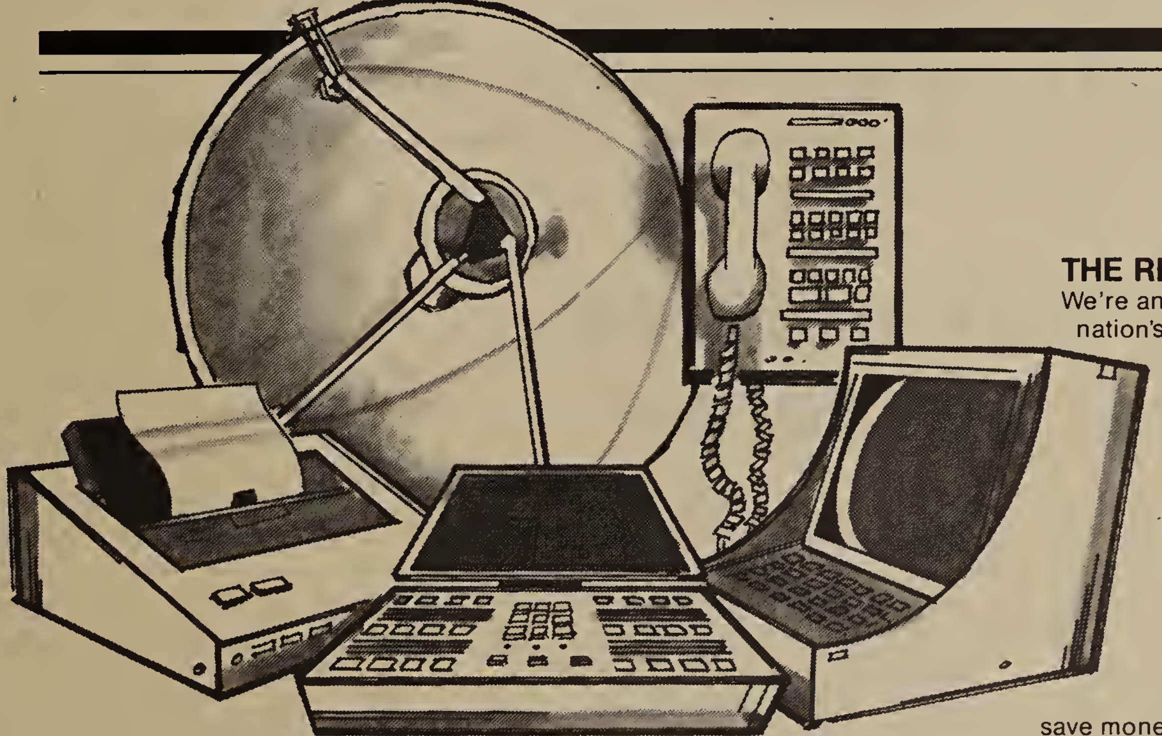
Users seem to like the idea. Comsat's mobile hub station is already slated for 700 weeks worth of on-site demonstrations. According to Charles Reutter, network products marketing director for Comsat, a second mobile hub is being built to handle growing demand for such demonstrations.

AT&T's announced entry into the transmit/receive Vsat market [*Network World*, March 24] may serve to boost user interest in the technology.

The carrier has filed to offer Vsat service — dubbed Skynet Star Network Service — beginning mid-April. The digital data and videoconferencing service will support transmission speeds of 9.6K bit/sec, 56K bit/sec and 1.54M bit/sec.

Continued on **page 68**

TALK TO US ABOUT COMMUNICATIONS SYSTEMS.



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▶ SMART BUILDINGS

Cityplace seeks savior

ShareTech successor sought.

BY PAUL KORZENIOWSKI
Senior Writer

HARTFORD, Conn. — Users of shared tenant services at Cityplace, a 38-story so-called smart building here, could have used a magic lamp that grants three wishes when, in January, it was announced that their service supplier, ShareTech, Inc., would soon be dissolved.

Users were concerned that ShareTech's breakup would disrupt their operations at Cityplace, one of the nation's first office complexes designed to house shared tenant services. Such services enable building occupants to share private branch exchanges, long-distance services and computers.

Threatened with the potentially messy breakup of ShareTech, users wished for continued availability of their services, a quick resolution to the company's ownership questions and a corporate white knight to take over the shared services after ShareTech's dissolution. Those wishes appear to be coming true.

Since the January announcement, ShareTech, the highly touted joint development effort launched in 1984 by AT&T and United Technologies Corp. (UTC), has trimmed its staff from 200 to 70 employees. Most of the cuts came from ShareTech's sales and marketing staff, not from support staffs at the 27 facilities the company currently maintains, said David Grimes, ShareTech's chief operating officer and vice-president of operations.

ShareTech's experience with Cityplace seems to mirror the problems other providers are experiencing in meeting initial, optimistic expectations for shared tenant services — a factor AT&T and UTC cited in dissolving ShareTech. Of Cityplace's 37 tenants, only 10 signed up for ShareTech services. Even though 2,500 people work at Cityplace, only 450 telephones are connected to the ShareTech PBX, a UTC Lexar model. Grimes declined to divulge financial information for the Cityplace venture, but observers speculated that the site had been losing money.

One reason for ShareTech's limited success with Cityplace was that Aetna Casualty and Surety Co., which occupies approximately half of the building, decided to buy its own equipment rather than pay for ShareTech services.

Another problem that contributed to the malaise was that ShareTech did not have a financial relationship with Bronson & Hutensky Co., the building's developers.

Ownership questions will probably be resolved in the next few weeks. Grimes reported that agreements have already been reached with companies hoping to take over services at many ShareTech sites. Close to a dozen companies, including many of the regional operating companies, have bid on various ShareTech properties.

"Once we resolve ownership questions at all our sites, we will announce who is going to get what," Grimes said.

Cityplace's white knight appears to be someone very familiar with shared tenant services — former ShareTech president and chief operating officer, Anthony D. Autorino. In January, Autorino resigned his ShareTech positions, formed his own company, Shared Technologies, Inc., and moved to Hartford, where he has close ties both to the city and to Cityplace.

▶ BIG BLUE

IBM's Opel retires top office

BY NADINE WANDZILAK
Staff Writer

ARMONK, N.Y. — John Opel will step down June 1 as chairman of IBM in what the company last week called an "orderly progression" of leadership.

Opel, 61, and his successor, John F. Akers, 51, have "different personalities, but similar business philosophies," said Frank Gens, an analyst with Framingham, Mass.-based International Data Corp. Gens and other IBM-watchers anticipate no sudden shift in direction by the company. The Opel-to-Akers succession appears to be part of a steady transition conducted over recent years. Akers succeeded Opel as president in 1983, and as chief executive officer in 1985.

During Opel's tenure as CEO, he articulated four goals for IBM in the 1980s: to grow with the industry; exhibit leadership across product lines; operate efficiently; and sustain profitability and growth. That philosophy helped IBM prosper in the first half of the decade, although the company's financial performance has waned of late.

▶ LOCAL NETS

Zenith broadband LAN marks first net foray

BY BOB WALLACE
Senior Writer

GLENVIEW, Ill. — Zenith Electronics Corp. unveiled a broadband, coaxial cable-based local-area network that the company said is capable of supporting thousands of devices separated by as many as 30 miles.

Semir Sirazi, director of Zenith's Communications Products group, said Z-lan will support any mixture of RS-232 asynchronous computers, terminals, modems, printers and other equipment. Z-lan features a per-port price of roughly $400. The system can accommodate four separate 500K bit/sec networks on a single 6MHz channel, while allowing other data, video and voice services to coexist on the same cable.

The announcement represents the company's first foray into the local-area network marketplace and comes on the heels of two recent sales coups staged by its computer subsidiary, Zenith Data Systems. Zenith Data Systems won the largest microcomputer procurement contract ever awarded by the federal government. The $242-million deal calls for the company to supply 90,000 desktop computers to the Department of Defense.

Kim Myhre, communications research group director for the Framingham, Mass.-based International Data Corp., said Zenith must demonstrate the ability to implement and support its networks if Z-lan is to succeed in the crowded broadband local-area net market. "The vendors that will succeed will be the ones that provide technical skills, such as cable design and engineering, software development capabilities and network implementation expertise," Myhre predicted.

The Z-lan product family includes the Z-lan-500D, a dual-port network communications unit (NCU); the Z-lan-O6FTR, a frequency translator; and the Z-lan-500BRG, a bridging device to interconnect NCUs on different channels. NCUs in eight and 16-port configurations will be available later this year.

Z-lan will be available in June. The Z-lan-500D is priced at $795. The Z-lan-O6FTR is priced at $1,995. The Z-lan-500BRG is priced at $9,900.

IBM from **page 4**

to-mainframe market is ready for this type of product."

David Saykally, president of Sterling's Answer Systems Division, saw the move as a response to Cullinet Software, Inc.'s recently delivered micro-to-mainframe link, dubbed Infogate.

The Cullinet link has been enhanced so that it works with microcomputer packages such as Lotus 1-2-3, Symphony, Ashton-Tate's Dbase line, and packages that support Data Interchange Format.

"IBM doesn't want to be losing mainframe data base sales simply because it can't link IMS with popular microcomputer packages," Saykally said.

The IBM offering differs from what many people perceive as microcomputer-to-mainframe links, according to Mac Lewis, senior vice-president of operations at Systems Center, Inc., an Irving, Texas, communications vendor.

"Most links consist of file transfer facilities. There are not very many packages that supply data formatting features," Lewis explained.

Users may perceive the new offerings as unneeded alternatives in an already muddled array of options for linking micros to mainframes.

"There is a tendency to lump a lot of products into the category of links. But each meets a distinct need," said David Ferris, president of Ferris Corp.

3Com from **page 2**

share for each of 3Com's 13.5 million common outstanding shares. Both stocks have been trading at almost equal levels since the proposed merger was announced last December.

According to statements contained in the Feb. 26 prospectus, "potential joint benefits" of the merger included strengthened research and development, an integrated product line for work group computing applications, expanded distribution channels and combined financial resources.

> *"According to the prospectus, 'potential joint benefits' of the merger included strengthened R&D."*

In addition, according to the prospectus, the companies already had entered "certain limited arrangements to facilitate the business transition involved in the combination of the two companies."

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Private line from **page 1**

leader and Bell Communications Research district manager of business operations and systems support.

While Aris automated the process and reduced paperwork, it was not equipped to deal with the unexpected order and provisioning mess that developed as a result of the AT&T divestiture.

After extending the time required to install most private-line circuits from the predivestiture standard of 28 working days to 48 working days at the height of postbreakup confusion in June 1984, AT&T Communications was still behind schedule in installing 80% of its orders. The private line backlog peaked at 44,300 orders.

Today, AT&T claims it is installing 90% to 95% of its private lines on or before schedule, and in January, it reduced the installation interval promised customers to 40 days, according to a company spokesman.

The software modification of Aris, which includes more than 400 changes to the original system, promises to smooth the ordering process and enable long-haul carriers to further cut their installation intervals, according to Blanton.

While all long-distance carriers will benefit from the streamlined version of Aris, AT&T stands to gain the most, because it is the only carrier presently linking its order-processing computers directly to the former BOCs' data centers.

AT&T accounts for 85% to 90% of the 20,000 access service requests received daily by data centers at 18 of the former BOCs. Two of the RBOCs, Nynex Corp. and Pacific Telesis Group, use internally developed order-handling systems, Blanton said.

Aris consists of two subsystems: the Exchange Access Control and Tracking System known as Exact; and the Translator to Universal Service Order Codes and Field Identifiers, TUF for short.

Exact is used to validate orders before they are submitted, and later, to control and track them. Its initial task is to verify an order's data, making certain that information within fields on order forms is consistent. "Before Aris, we were getting some carrier orders that were 100% wrong," Blanton said.

TUF translates order information into a standard code for equipment and lines for billing and provisioning.

In practice, AT&T will submit an order as a batch job, then the local company in question will process the record electronically and do any necessary changes for provisioning. The local company then sends the document back to AT&T for confirmation, Blanton explained. The receipt also gives AT&T the provisioning interval and defines the exact type of circuit and equipment to be used.

Aris will encourage AT&T and other long-haul carriers to reduce the time it takes to turn on circuits because of a simple economic fact: Local companies begin to charge long-haul carriers for local access links as soon as they are installed, regardless of whether the entire end-to-end circuit is complete.

As the order and provisioning is streamlined, the local pressure will thus motivate the long-haul carriers to lower their promised installation intervals. For its part, AT&T welcomes any change that will reduce that interval, a company spokesman said. ◼

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M/A-Com from **page 2**

from operations being discontinued and potential operating losses.

The company's integrated digital communications operations are expected to contribute most to the second-quarter loss, according to Bothwell.

He said the company's microwave components business, in which it supplies silicon substrates to semiconductor manufacturers, has been "seriously impacted by the computer industry downturn and foreign competition."

He noted that the home television receive-only equipment market, which has suffered from foreign competition and oversupply, would partially recover when consumer confusion regarding descrambling technology subsides.

"Last year, 1.5 million earth stations were installed at a rate of 40,000 to 50,000 units per month. To meet that demand, domestic suppliers, including M/A-Com, expanded capacity, then the market declined. Foreign suppliers are looking at this as a high-growth consumer electronics market and have slashed prices. [Communications Satellite Corp.] quit the business; California Amplifier quit. We are considering consolidating certain manufacturing plants and taking a write-off in the second quarter to provide for that contingency."

A year ago, M/A-Com reported a net income of $9.9 million for the second quarter on sales of $210.2 million. The company reported sales of $844 million for all of 1985. M/A-Com has not had a losing quarter since 1952, its second year of operation, when it reported a $25,000 loss. Bothwell said the company does not expect to report a loss at year end 1986. ◼

INDUSTRY UPDATE

“In the central office-switching arena, Siemens Communications Corp.'s recent deals with Ameritech make the manufacturer the only firm — apart from AT&T and Northern Telecom, Inc. — to crack the potentially lucrative replacement market for Bell operating company switches. There is speculation that Bell Atlantic and the other BOCs are “playing the Siemens card” to put pressure on their two established CO switch suppliers, AT&T and Northern Telecom.

From **Trends in Competitive Telecommunications**
by North American Telecommunications Association.

▶ SATELLITE TRANSMISSION

Satellite plans grounded

Space shuttle disaster delays planning for future launches; Nasa woes may prove costly to Western Union and GTE.

BY PAUL KORZENIOWSKI
Senior Writer

Uncertainty about the future of the National Aeronautics and Space Administration's (Nasa) space shuttle program has clouded the satellite launch plans of some key satellite service providers.

Western Union Corp. and GTE Spacenet Corp. had each planned to launch one communications satellite from Nasa shuttles by the end of this year. Western Union's satellite payload was scheduled to be launched in June, while GTE's was slated for November.

But in the wake of the explosion of the space shuttle Challenger in January, it appears shuttle launches will be delayed for at least a year and perhaps longer, depending on the recommendations of the presidential committee investigating that tragedy.

Both companies are hoping the confusion currently surrounding the shuttle program will delay their launches by no more than 12 to 18 months.

But those hopes may be quashed. The delay will certainly create a backlog of satellite launches. And when shuttle service resumes, deployment of commercial satellites will take a back seat to the launching of Department of Defense and research satellites, according to Chet Lee, Nasa's director of customer service and business development. Western Union and GTE could be facing a two-year delay, he said.

“Companies that use our launch service have a business decision to make concerning their next step,” Lee said. “Most were smart enough to build a time delay into their business plans.”

Officials at Western Union and GTE stated that their companies are exploring alternative plans and are awaiting the presidential committee's recommendations before determining their next steps.

But the companies seem to have no alternative to waiting. Reservations for satellite launches have to be booked two to four years in advance. That time is needed to develop satellites designed for specific launch vehicles.

Continued on **page 10**

INDUSTRY EYE
BY KARYL SCOTT

Integrated services digital network: Its fame outraces its feats

Integrated services digital network is the latest buzzword to take hold of the communications industry.

Equipment and service vendors are eager to support the still-evolving technology. In the minds of service providers, the benefits of ISDN are very clear, but to the communications customer, ISDN is still somewhat of a mystery.

ISDN is perhaps less of a mystery in Europe, where the momentum to develop uniform networks is far more pronounced than here in the U.S. The Europeans are able to move more quickly because their Postal Telephone and Telegraph agencies maintain rigid control over national network policy.

There are two interfaces. The Basic Rate Interface, also referred to as 2B plus D, affords users two 64K bit/sec channels for data or voice and one 16K bit/sec channel for signaling information. The Primary Rate Interface features what is known as 23B plus D. There are 24 64K bit/sec data channels and one 64K bit/sec signaling channel.

In its purest form, ISDN will permit the integration of local- and wide-area nets as well as long-distance public nets. Voice, data and video will be transmitted over a single network.

AT&T boasts in its promotional material, “ISDN to some is a distant vision of the possible future of telecommunications. To AT&T, ISDN is a reality.”

ISDN features can be found in equipment and services that AT&T is currently offering, according to company President James Olson. For instance, AT&T is selling its System 75 and System 85 private branch exchanges and 5ESS switch on the merits of their ISDN functionality.

These products are actually precursors to ISDN, and the attempt to sell them as anything different further confounds the user community, which is already struggling to understand the basic underpinnings of the concept.

AT&T, the Bell operating companies and a few select users are planning ISDN tests in the upcoming year. However, the first and perhaps best known of these to be announced — that is, Illinois Bell setting up a network for McDonalds Corp. — has been put on hold because software for the AT&T Number 5ESS central office switch is not ready.

Other tests may be similarly affected.

AT&T and the proponents of ISDN have a long way to go in educating communications users about ISDN. In its effort to remain at the forefront of the ISDN movement, AT&T and other ISDN proponents are perhaps getting a bit ahead of the rest of the market.

Rather than expounding on the ISDN services available today, since there are actually none, AT&T and its counterparts need to take a step backward and convince users of the need for such a technology. Users are understandably reluctant to invest in a concept.

That task will not be an easy one, since most of the benefits of ISDN will be transparent to users. The all-digital, consolidated network of ISDN will eventually provide cost savings to the user and increased capabilities, but this has yet to be realized.

CONTRACTS

SAN JOSE, Calif. — Telecom General Corp. announced a $4.9-million agreement with Bridge Market Data, Inc. of St. Louis for the purchase of Kunet products and services for its Bridge-sat network.

MOUNTAIN VIEW, Calif. — Equatorial Communications Co. has signed a five-year distribution agreement with Victori Comunicacoes LTDA, a Brazil-based distributor of telecommunications gear valued at $30 million. The latter will sell Equatorial's interactive and point-to-multipoint satellite nets.

SUNNYVALE, Calif. — Under an $80 million multiyear agreement, the Telecommunications Systems division of Toshiba America, Inc. will supply key and PBX systems to USX Telecenters, the Sunnyvale-based chain of franchised business telephone centers.

PARIS — The Telespace company, part of the Alcatel group, announced a $5.4 million contract with the Mauritius-based Overseas Telecommunications Services Co. The contract calls for a ground station and a domestic network based on Intelsat's “Vista” system.

MARLBOROUGH, Mass. — Concord Data Systems, Inc. announced a contract with Tymnet McDonnell Douglas Network Systems Co. for shipments of CDS 224 Trispeed modems and hardware.

▶ BELL OPERATING COMPANIES

US West retires 3,600 early

Financially troubled US West announced that approximately 3,600 employees have elected to accept early retirement as a result of special incentive programs first announced in November 1985.

Most of the retiring employees are from US West's three telephone companies, Mountain Bell, Northwestern Bell and Pacific Northwest Bell.

According to Howard Doerr, US West executive vice-president and chief financial officer, resulting salary and other savings will fully offset the early retirement costs by the end of the current year.

Doerr said his company will be recording a "one-time pension expense of $95 million and $19 million in other related onetime incentives this quarter.

"The changing competitive nature of the industry, technological advancement and the changing nature of the work dictate smaller staffs and bigger jobs," he said.

Satellites from page 9

Both companies stated that a delay of up to 18 months would not seriously impact their present business plans.

A Western Union spokesman claimed the company has sufficient excess capacity to meet the needs of its current customers. Western Union currently has four satellites in use.

However, any lengthy delay could affect the vendor's ability to offer new services and add customers, the spokesman admitted.

GTE had planned to launch three satellites this year: one via a shuttle and two through Nasa's principal competitor, France's Arianespace, which is located in Paris and conducts its launches from French Guiana. "We would have sent all of our satellites up on the Nasa shuttle, but we weren't able to make reservations on Nasa flights," a GTE spokeswoman said.

One Arianespace launch, scheduled earlier this month, was rescheduled for last Friday; a second is targeted for this summer. The deployments will bring GTE's satellite count to six. "We planned to have seven satellites in orbit in the next few years," the spokeswoman said.

"We don't plan to ask the Federal Communications Commission to approve more than that number, so a launch delay should not affect us."

Commercial satellites have been launched from shuttles since the fourth shuttle mission.

> **"GTE had planned to launch three satellites this year: one via a shuttle."**

One or two satellites have gone up on various shuttles, and approximately 25 commercial satellites have been sent into orbit.

"The commercial launches were started to defray the cost of the shuttle," Lee said.

Satellites have been deployed for countries, such as Indonesia and Great Britain, as well as companies.

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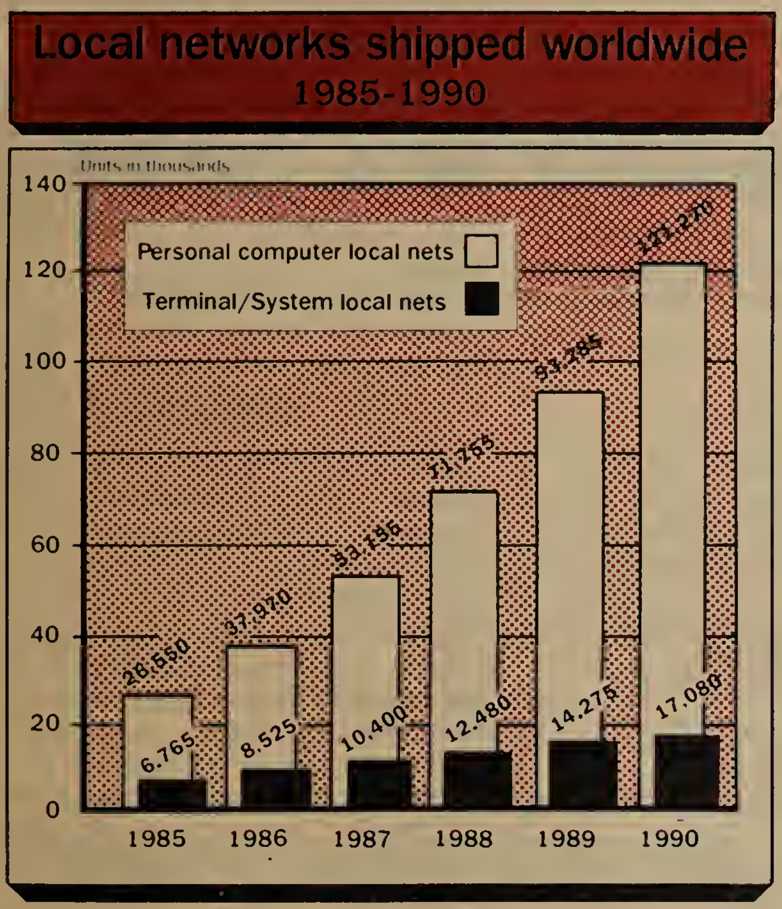
TELECOM TRENDS

“If Pro America, AT&T’s proposed new optional calling plan, starts on schedule, many small- and medium-sized businesses now using MCI Communications Corp., GTE Sprint Communications Corp. and other new long-distance companies could find their current 11% to 18% long-distance savings over AT&T falling as low as 2.2%. That is if — and this is the key — the new companies cannot make major price cuts in response to AT&T’s new plan. But don’t be surprised to see services like Pro MCI or Pro Sprint bow in response to Pro America.

Robert Self
founder of Market Dynamics
New York



SOURCE: INTERNATIONAL DATA CORP.

▶ ANALYSIS

ALC digs in

Allnet, Lexitel pairing faces tough going in long-haul mart.

BY JOHN DIX
Senior Editor

CHICAGO — The recent merger of Allnet Communication Services, Inc. and Lexitel Corp. has secured the new company, ALC Communications Corp. (ALC), a more stable place than its forebears held in the competitive market for long-distance communications. But like others doing battle with AT&T Communications, Inc., ALC still has a tough row to hoe.

The corporate marriage, consummated in December, has since been eclipsed by a similar deal being entered into by GTE Sprint Communications Corp. and US Telecom, Inc. The Allnet-Lexitel merger makes ALC the fourth-largest long-distance carrier, behind AT&T Communications, Inc., MCI Communications Corp. and US Sprint Communications Corp. The new company, headquartered here, has nearly 500,000 subscribers and total revenue of $500 million.

Both Lexitel and Allnet began in 1980 as resellers, companies that buy bulk transmission capacity and resell it piecemeal for a profit — or try to.

ALC’s success will depend in large part on three factors: the company’s ability to impose cost controls necessary to make

Continued on **page 12**

▶ LOCAL-AREA NETS

Wang works on Token-Ring bond

After word leaked out a few weeks ago that Wang Laboratories, Inc. had purchased token-ring chip sets from Texas Instruments, Inc., Wang admitted it had begun development to support IBM’s Token-Ring Network — a decision the Lowell, Mass.-based vendor had put off until recently.

The chip sets are to be used in interface equipment that Wang is developing for its VS line of office automation computers and for certain classes of workstations, said Dave Tolwinski, senior product manager of local-area network products for Wang.

A VS system with a Token-Ring interface would also be able to act as a gateway to Wang’s own Wangnet or Fastlan local-area networks, Tolwinski said. Wang has installed roughly 1,000 to 1,200 Wangnets and Fastlans, he said.

Token-Ring support is an “important consideration in IBM compatibility,” Tolwinski said. Wang’s strategic direction is toward the International Standard Organization’s Open System Interconnect environment, but “we intend to provide a certain level of compatibility with IBM in the interim.”

Continued on **page 12**

CROSS TALK

BY JOHN DIX

Vsats vs. land lines: No contest?

Unlike many technological developments in communications, small-dish antenna satellite networks offer such radical savings over present data communications alternatives that their rapid acceptance is virtually guaranteed.

AT&T’s market entrance two weeks ago [*Network World*, March 24] and widespread speculation that IBM will soon follow suit bestows a blessing on an industry that was doing fine without sanctification.

The economic motivation for so-called very small aperture terminal satellite networks, when compared to land lines, is often overwhelming. While AT&T’s major terrestrial common carrier competitors are struggling to offer the 10% or 15% savings normally required to get a customer to change carriers, Vsats are doing somersaults over these figures.

E.F. Hutton & Co. in New York, for example, installed a satellite system last year from Equatorial Communications Co. that is expected to pay for itself within a year.

The Vsat network cost roughly $1.25 million and will pick up much of the traffic carried on the company’s $4.8 million per year leased line network. The company expects to save $9.3 million over the next seven years.

Originally, Vsats supported only one-way, point-to-multipoint broadcast traffic service. While this limited their application, Vsats worked well with certain data base updating and transaction-oriented networks, like E.F. Hutton’s.

Two-way service is now becoming standard, which will give private lines an even more viable competitor. AT&T’s new Skynet Star Network service is two-way, and most of the other carriers, such as Equatorial, Vitalink Communications Corp. and Tymnet, Inc., offer similar services.

Vsat systems differ in price, speeds supported, components offered, maintenance provided and level of management included. Some vendors will only sell and install systems, while others offer ongoing monitoring services.

Two notable absentees in the Vsat vendor lineup are IBM and GTE Telenet Communications Corp.

IBM just reached a highly publicized agreement with M/A-Com, Inc. to purchase small-diameter Ku-band satellite dish antennas. When it sold Satellite Business Systems (SBS) to MCI Communications Corp. for a 16% return in the discount long-haul carrier, IBM retained three SBS satellites.

Speculation abounds that it will use part of one of these satellites for a Vsat service. It is unclear, however, what IBM’s tack will be: to create a Vsat offering of its own to complement computer equipment sales or to market through MCI.

The other company that can soon be expected to jump into the Vsat fray is GTE Telenet. It has all the necessary pieces. The merger of GTE Telenet and US Telecom Data Communications Co. presents a rich potential user base, and the satellite facilities and expertise are available through GTE Satellite Corp. and the former Isacomm, which is now a satellite carrier within US Telecom.

While Vsats will not obsolete leased lines, they do promise to attract some large customers, possibly encouraging further restructuring of leased line rates. This can only be hastened now that AT&T — the largest leased line provider — is in the market.

ALC from **page 11**

Lexitel profitable on financially ailing Allnet; the acquisition of transmission facilities through purchase or long-term lease to lessen the company's dependency on other carriers; and its adroitness in wooing commercial customers.

Perhaps the most pressing task for ALC is to turn Allnet around. Lexitel was profitable at the time of the merger.

William A. Maloney, vice-president of marketing and sales, attributed that to strong management and the fact that Lexitel was a regional carrier, concentrating its resources and marketing efforts in nine Midwestern states. Allnet, on the other hand, was an unprofitable national carrier, a victim of high costs and difficulties in collecting on debts.

On paper, the union is compatible. Lexitel has the financial controls that Allnet needs, and Allnet brings to the deal a base of more than 300,000 subscribers and the private network facilities Lexitel was lacking. ALC claims to own or have on long-term lease 45% to 50% of its 13 million network route miles. It wants to double that to 26 million route miles by the end of the year and increase its stake in facilities to 85%.

Much of the new capacity will be leased from so-called carrier's carriers, companies that build facilities to lease to service providers. "By getting into bulk long-term leases, we have our own network at fixed long-term prices without the necessity of incurring huge capital costs," Maloney said. "We expect to have 85% of our traffic originating and terminating on our leased facilities by the end of the year."

Ultimately, ALC's success, as with other AT&T competitors, will depend on how well it can woo corporate America. Twenty percent or less of a carrier's commercial customers may generate 80% or more of its total revenue.

Today, Maloney said, businesses make up roughly 30% of ALC's customers and generate abut 80% of its revenue. In recognition of the importance of commercial accounts, ALC has refocused its marketing.

"We will be targeting our advertising and sales force primarily at the commercial market," he said. "We will not be targeting residential customers."

But Bill Reed, a senior analyst with Link Resources Corp. of New York, expressed skepticism about those figures. "I would be surprised if 30% of ALC's customers were commercial. Allnet didn't do any business marketing until it got into financial trouble, and then it had to cancel its residential campaign," Reed said.

Part of the problem ALC has in luring commercial accounts is a lack of service diversity. The company's primary business offering is a Wats-like service aimed at users with bills of $1,000 per month or more.

For lower bills, it offers two types of dial-up services: Dial 1 equal access arrangements, where ALC would be designated as the user's primary carrier and accessed by dialing one digit; or the dial-in option, which requires use of a switch access number and a personal access code.

The offering most conspicuous by its absence from the company's service repertoire is private line service. ALC does offer some leased facilities, but only to a limited group of customers. Similarly, only a few T-1 facilities have been sold.

"Private lines will not be a priority for 1986," Maloney said. "In 1987, after the network has been expanded and more capacity brought on, the sale of private lines will become more feasible," he added.

ALC does plan to react to AT&T's recently announced Megacom service, a bulk calling service that is a tier above Wats. Maloney said its service will be more economical than its Wats-like service for customers that spend $10,000 to $12,000 per month. The company currently does not plan to offer virtual, or so-called software-defined, networks.

To its credit, "ALC has a reputation as a solid, quality service provider," said Jeff Kaplan, a senior analyst with International Data Corp., a Framingham, Mass.-based research firm.

But to survive, ALC needs to woo more commercial accounts and continue its network expansion. Part of its growth plan includes envelopment of other troubled resellers. "We will probably be in the acquisition mode for some time," Maloney said.

Wang fom **page 11**

The product manager would not divulge when Token-Ring support will be available, saying only that the capability will be announced "when it makes good marketing sense." Availability hinges on user acceptance of the Token-Ring system and the timing of IBM's merger of its Systems Network Architecture and the local-area network, Tolwinski said.

Besides Token-Ring support efforts, Wang is said to be working on a 1M bit/sec version of the 802.3 Ethernet standard on twisted-pair wiring and a 10M bit/sec 802.3 transport network.

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> chairman
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▶ NETWORK MANAGEMENT

Two roads to integration

Avant-Garde, Infinet debuts reveal diverse strategies.

BY PAUL KORZENIOWSKI
Senior Writer

When it comes to network management, more does not necessarily mean better. Currently, large corporations have at their disposal a slew of network management tools. But no single product easily supplies an overview of a typical hybrid corporate network.

Two leading players in the network management game, Avant-Garde Computing, Inc. and Infinet, Inc., are taking different approaches to solving that problem.

Avant-Garde, of Mt. Laurel, N.J., last week introduced a central network management console, Net/Command, that can gather information from a variety of devices, including modems, multiplexers, matrix switches, host software and performance monitors.

The Avant-Garde console monitors IBM's Network Communications Control Facility (NCCF), Network Problem Determination Application and other IBM network management facilities that use an IBM 3270 Model 2 terminal. Equipment from Codex Corp, T-Bar, Inc., Bytex Corp. and Network Equipment Technologies is also supported.

Net/Command's console is a color terminal that supports multiple windows in a manner similar to the IBM 3290 terminal. Each window allows a user to monitor one net management package. For example, one window can control

Continued on page 14

DATA DIALOGUE

BY GABE KASPEREK

Data scope checklist

The first of a two-part series.

The first question asked concerning network management is, "Why should an organization bother to run diagnostic tests?"

The major reason is that all companies want to reduce problem isolation time. When there is a problem that hinders users from accessing resources, operations personnel spend a great deal of time determining which network component is the defective one.

Second, vendors are loathe to admit that their equipment is the source of a problem, and they point fingers at the competitors' products, which then delays problem resolution. So, most organizations do not like to depend on a vendor's field service staff for support. Instead, the user prefers to take charge, isolate defects and call a vendor when there are specific problems.

There are many techniques and technologies for network control, and every company uses manual testing techniques in some form or another.

This column will help users formulate specifications for an important testing tool: the data analyzer.

Often, a data analyzer is chosen by management and then handed down to the operations personnel. Such test equipment often ends up in a corner collecting dust.

Selecting proper test equipment requires input from the technicians who will use the tools regularly. This input helps keep the selection process on track. A checklist could include either all or a few of the following items:

1. Machine/operator interface
2. Programmability
3. Speed
4. Storage techniques
5. Remote control
6. Hard copy
7. Upgrading
8. Automonitoring
9. Performance analysis
10. Physical dimensions
11. Cost

In this week's column, we will discuss the first three items. Next week, we examine the other eight items.

1. *Machine/operator interface.* This is the most important characteristic for test equipment. A well-designed interface reduces the potential for operator error. An operator should be able to manipulate a data analyzer easily, without spending a lot of time learning how it works. Time spent looking through the operator's manual adds to the time needed to isolate a problem.

2. *Programmability and software.* Data analyzers have two

Continued on page 14

Ascii support in IBM SNA products

IBM Product	3710 Network Controller	3708 Network Conversion Unit	Series/1	7171 Ascii Device Control Unit	7426 Terminal Interface Unit
Protocol conversion	Yes	Yes	Yes	Yes	Yes
Protocol enveloping (Like NTO)	Yes	Yes	No	No	No
Maximum downstream ports	59	4	56	64	4
Channel attach	No	No	Yes	Yes	No
Network attach	Yes	Yes	Yes	No	Yes
Attach to multiple hosts	Yes	Yes	Yes	No	No
Attach to Ascii hosts	Yes	Yes	No	No	No
Network management	Yes	Yes	No	No	No

SOURCE: COMMUNICATIONS SOLUTIONS, INC.

▶ VIDEO TELECONFERENCING

Videophone system out

PEABODY, Mass. — Pictel Corp. threw its hat into the desktop video teleconferencing ring with a system that transmits full-motion color video images over 56K bit/sec dial-up lines, such as AT&T's Accunet Switched 56 Service.

The Videophone System works like a typical conference call, except that the speakers can see one another. It consists of one or more desktop videophone terminals, an analog local-area network and a video coder/decoder.

The terminal includes a video camera and a 13-in. screen, a speakerphone, digital keypad and local-area network attachment. The terminal can also function as an IBM Personal Computer-compatible device. A personal computer display can be shown in place of a person.

Local network products include a net controller that can support up to eight adapter cards, which come in three models. A videophone connector attaches a terminal to a controller over coaxial wiring. A second card connects a coder/decoder converter to the network. A third enables networks to be attached so that up to 200 videophones can take part in one conference.

Pictel said that the product is designed for the visual communications market and cited a University of Wisconsin Center for Interactive Programs report that estimates this market will grow from its 1986 revenue of $126 million to $800 million in 1990.

The Pictel system is based on technology used in Datapoint Corp.'s Minx system.

A Pictel system with five desktop terminals, local-area network attachments and a video coder/decoder costs about $150,000. Availability is set for the end of the second quarter of 1986.

Net management from **page 13**

IBM's NCCF, and a second can be linked to Codex Corp.'s Distributed Network Control System 4000.

To examine how a network is functioning, the operator shifts from window to window. Also, alarm conditions can be set so that Net/Command will automatically invoke a package's capabilities in response to specified problems.

Net/Command consists of the control terminal and network access units. One access unit is needed for each network management package linked to Net/Command. An access unit plugs into an available RS-232 port and transmits network management information to the central console. Net/Command also offers an expert system option, which guides a network operator through the steps of problem resolution.

Net/Command was shipped to a beta user earlier this month and is currently available. Prices for the product range from $20,000 to $150,000.

North Andover, Mass.-based Infinet is moving to integrate other vendors' control products with its Network Information System (NIS) 90 series of network management systems.

The company last week incorporated a performance measurement system from Tesdata Systems Corp. in McLean, Va., into the NIS product line.

The Tesdata Systems performance measurement system, PMS-III, was announced as a stand-alone product earlier this year. It provides response time measurements, integrates graphics and spreadsheet capabilities, carries out remote performance measurement tests and supplies real-time network problem reports.

PMS-III is now supplied as a standard feature of the NIS 90/70, a new system, and the NIS 90/60 and is available as an option for the NIS 90/50 and NIS 90/40. The top of the line NIS 90/70 is able to support up to 16 users and is equipped with 1G bytes of random-access memory.

The package's problem management feature automatically tracks trouble calls, and its report management facility periodically produces problem reports, activity reports, inventory details and test results. A scheduled automatic preventive maintenance feature tests circuits and devices when the network is off-line.

Prices for NIS 90/70 start at approximately $150,000.

In addition to the NIS enhancements, Infinet announced a 9.6K bit/sec Trellis coded modem, a line of X.25 products and three T-1 multiplexers.

Like PMS-III, the products were developed by other vendors and announced as stand-alone devices. Eventually, they will be integrated with the company's NIS 90 systems, according to William McCarthy, vice-president of product marketing at Infinet.

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Diagnostics from **page 13**

basic modes of operation: monitor mode and interactive mode. The monitor mode is all that is needed to understand how an interface is behaving.

If the organization is dealing with protocols such as X.25 or Systems Network Architecture, protocol-decoding software will help an operator know how the network is functioning.

This software dissects protocol frames and displays critical fields so that an operator can detect problems. Many vendors provide support for a variety of protocols.

The interactive mode in data analyzers is used to test intelligent data terminal equipment and data communications equipment. In this mode, an analyzer can mimic various protocols and conduct tests on a number of devices.

Many vendors provide command statements that have been tailored to their products. These commands, which operate like Basic programming statements, can be executed by pressing special function keys. They will construct and send frames and packets of information to test various devices.

The development of test software is a difficult process that can be avoided if the selected product already includes the capability. Typically, this software requires additional storage, such as a floppy disk or an electrically erasable, programmable, read-only memory cartridge.

An operator inserts the floppy disk into the data analyzer, strikes the "run program" key and the program will thoroughly test the device. A major advantage of this process is that it does not require the operator to understand complex protocols.

3. *Speed.* The data analyzer, through the use of plug-in modules or other mechanisms, should be able to support various types of interfaces. All data analyzers support RS-232 interfaces and speeds of up to 19.2K bit/sec. If 56K bit/sec support is needed, the product will require a V.35 interface However, high-speed interfaces cost a lot.

Kasperek is president of Kazcom, Inc., a Park Ridge, Ill., consulting firm that specializes in network management.

PRODUCTS & SERVICES

Bytex enhances matrix switches

Bytex Corp. enhanced its line of matrix switches so that they can work with T-1 input.

The **T-1 port card** can work with either 1.5M bit/sec or 2.408 bit/sec transmission speeds and supports AMI, B8ZS and HDB3 signaling formats through strap selection.

The port card can be added to the Autoswitch 100, Autoswitch 240 and Autoswitch 480 matrix switches. A fully configured unit, dubbed Autoswitch 240 "T," can connect 30 T-1 ports in an unblocked manner.

The enhancement costs $3,500 and will be available in the second quarter of 1986.

Bytex Corp., Southborough Office Park, 120 Turnpike Road, Southborough, Mass. 01772 (617) 480-0840.

Microcom, Inc. of Norwood, Mass., announced its **High Density Modem System (HDMS)**, which accommodates up to 16 modem cards and 32 ports.

The line consists of a chassis, two types of controllers and two types of of dual modem cards. The HDMS/Chassis fits in a standard 19-in. rack and contains 17 card slots. The chassis supports a controller card and up to 16 dual modem cards: the HD/2400 or HD/2400c. The HD/2400 supports transmission speeds of up to 2,900 bit/sec and the HD/2400c works with speeds of up to 4.8K bit/sec.

The modem cards are CCITT V.22-compatible and work with the company's Microcom Networking Protocol.

Modem cards can be removed or inserted through the front of the unit without disturbing cable connections or turning off the power.

Two types of controllers are available: the Intelligent Network Controller and the Modem Controller. The Intelligent Network Controller collects data such as the number of calls successfully made and answered, the transmission speed of the calls, the number of failed calls and the reason for their failure. The Intelligent Controller supports up to 512 ports. The Modem Controller supplies verification and status of various Electronic Industries Association leads.

Prices for the products are as follows: Modem Controller, $199; Chassis, $1,599; Intelligent Network Controller, $1,499; HD/2400 Modem Card, $1,349; and HD/2400c Modem Card, $1,599.

Microcom, Inc., 1400 A Providence Highway, Norwood, Mass. 02062 (617) 762-9310.

Telebyte Corp. announced a 9.6K bit/sec asynchronous modem that incorporates data encryption features.

The **Model 2496AA Accelerator** features an error detection and correction algorithm that varies packet length to optimize throughput.

The Model 2496AA Accelerator includes a Hayes Microcomputer Products, Inc.-compatible automatic dialer and telephone directory. Once the modem establishes a connection, the product determines if the receiving device is operating in V.22 or Bell 212A mode and adjusts itself.

The modem sells for $995.

Telebyte, 215 Oak St., Natick, Mass. 01760 (617) 653-3995.

FACTORY COMMUNICATIONS

Sun Microsystems, Inc. offers a workstation network based on the Technical & Office Protocol (TOP). Sunlink OSI has been certified by Boeing Computer Services Co. as conforming to Version 1.0 of TOP. The net, which runs on Ethernet physical links, also supports the International Standards Organization's Open Systems Interconnect reference model.

Sunlink OSI costs $950 and will be available in May. *Sun Microsystems, Inc., 2550 Garcia Ave., Mountain View, Calif. 94043 (415) 960-1300.*

▶ INDUSTRIAL NETWORKING

AT&T's net answer man

Factory networking chief pilots communications giant's automation efforts.

When communications Goliath AT&T needs answers on industrial networking, it turns to Lou Weigle. As industrial data communications manager for AT&T, Weigle grapples with the networking issues familiar to other factory communications users — but on a far larger scale. He is responsible for the development and definition of a corporatewide factory communications specification for AT&T production facilities in the U.S. and abroad. Weigle is also charged with exploring Manufacturing Automation Protocol's (MAP) future role in AT&T's factory communications strategy.

Weigle joined AT&T 24 years ago as a member of Bell Laboratories' Engineering Information Systems group. He holds a bachelor of arts degree in mathematics from Princeton University and a master of science degree in mathematics from Stevens Institute of Technology.

Senior Writer Bob Wallace recently spoke to Weigle about industrial networking.

What has been AT&T's approach to factory networking?

Currently, we are using our own products. We predominantly use AT&T [local-area networks] such as the Information Systems Network and Datakit. Our factories are at various stages of installation of these local nets. We will spend hundreds of millions of dollars in industrial automation over the next year or so in an effort to bring down our production costs.

How does the MAP movement figure in AT&T's factory communications future?

We are implementing two MAP pilots in separate facilities, one in a process factory and another in an assembly factory. Both will use the MAP specification Version 2.1 and will be operational by the fourth quarter. We will only be doing the pilots where we have a viable networking backup and where the tests won't impact the facility's production schedule. We have discussed three different applications for the process MAP pilot, but we have not yet chosen a location.

What do you hope to learn from the MAP pilots?

We want to find out where we interface our equipment with outside vendor equipment. We are looking at MAP because we have a number of questions concerning functionality and

Continued on **page 16**

FACTORY FACTS

BY BHARAT THACKER

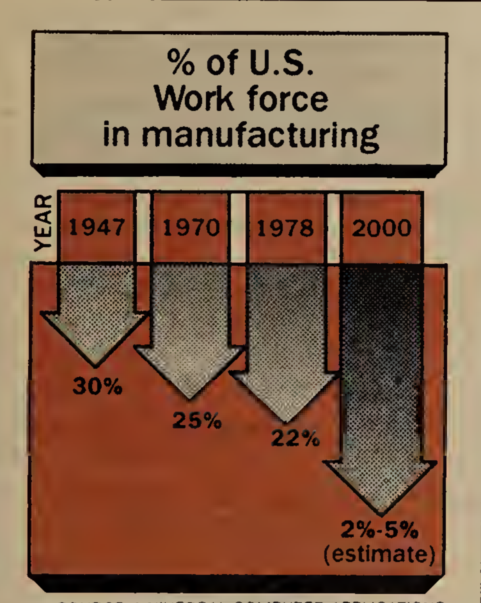
CIM more than just automation

Computer integrated manufacturing (CIM) has the potential for dramatically increasing the productivity and thus the competitiveness of companies in both domestic and international markets. CIM is the use of computing systems and technology to support the manufacturing process from product definition, through design and manufacturing, to the delivery of the finished product.

CIM is more than just automation. It is information systemization and management. It is also process mechanization, which includes the development, manufacturing, moving and testing of products.

CIM consists of the following:

- *Engineering technology* — design engineering, computer-aided design and manufacturing, computer-aided education, group technology, manufacturing engineering and computer-aided planning processes.
- *Factory automation* — numerical control/computerized numerical control/direct numerical control, robotics, automated material handling and automated storage and retrieval systems.
- *Manufacturing administration* — just-in-time, manufacturing resources planning II, real-time scheduling and cost and performance reporting.
- *Information technology* — computer hardware and software, communications, decision support, simulation, artificial intelligence and information centers.



SOURCE: UNIVERSAL COMPUTER APPLICATIONS

Human resources and its integration with the above elements are should not be ignored.

CIM does not mean throwing out all existing equipment, systems and procedures and replacing them with the latest technologies. Rather, it means evaluating production objectives, rationally viewing manufacturing flow and implementing the right blend of technologies for your company.

CIM is different for every manufacturer. The single common denominator is an organized plan. CIM can be implemented as an evolutionary, reduced-risk approach by simplifying, automating and integrating your operations.

The simplify-automate-integrate cycle is not a static, one-shot effort. A constant refinement of vision, expectations and actions results in a sustainable competitive advantage. CIM is not a low-level technical issue to be solved from the bottom up. CIM is as much a strategic issue as a technical one, and it requires commitment and involvement from management.

Successful CIM implementations require planning, organization and control.

Thacker is a founder of Universal Computer Applications, a Southfield, Mich.-based consulting firm specializing in manufacturing, with special emphasis on communications.

▶ FACTORY FLOOR

Sellers ink factory tool pacts

Intel Corp. last week announced an agreement with Electronic Data Systems (EDS) of Dallas to develop a speech workstation product line for industrial applications. A dollar figure for the pact was not given.

In another announcement, Digital Equipment Corp. signed a cooperative agreement with Control Systems Specialists (CSS) to market CSS's process control and data acquisition application for manufacturers in process industries.

The speech workstation system will provide hands-free, eyes-free data entry capabilities for industrial personnel. This agreement may eventually add speech to factory technologies such as robotics, vision and Manufacturing Automation Protocol (MAP). The pact also includes later development of a Multibus II version of the workstation for shipment in 1987.

The products created under this agreement will be based on Intel-developed technology. EDS will contribute resources and applications experience. The products will be manufactured and marketed by Intel to the industrial automation marketplace. EDS will purchase the

Continued on **page 16**

Network answer man from **page 15**

equipment interoperability in multivendor equipment.

How might MAP enhance the productivity of these facilities?

Any company that goes into MAP networking goes first for [the replacement of copper wire]. Local network technology is used to reduce your reconfiguration problems. There is a lot of equipment in our factories that is not our own. We have Allen-Bradley [Co.] and Gould [Inc.] equipment just like everybody else. It would be nice if we didn't have to create specific software and hardware interfaces for those machines. MAP would help us avoid having to create these interfaces for each system in a multivendor environment.

How can you measure savings realized by using MAP as a communications backbone in your factories?

We'll have to see where savings accrue from our MAP pilots. We would like to realize roughly a 15% cost reduction by not having to redo the communications software and hardware interfaces for each application.

How will MAP affect your current factory communications strategy?

Our first priority is to modify what we already have to support MAP. We still have to bring our factory units up the learning curve with this technology. The best way to do this is to bring MAP in and use it in an actual application. We will establish the pilots as a showplace for our other factories.

If the pilot tests are deemed successful, how will AT&T determine where this technology will be used?

The first thing to be considered is where MAP will actually pay off for us. We then must determine which of our other factory networking technologies have to be modified in order to interface with MAP.

If this information is useful on the outside as products, that's great, but the prime objective is to automate our factories.

Are you considering testing carrier-band subnetworking technology in either of the two MAP pilots?

No. We are not looking at carrier-band technology right now.

Is AT&T interested in using fiber-optic cable on the factory floor?

We are looking at fiber optics for two reasons. First, it's immune to electromagnetic interference. Second, it provides the high bandwidth necessary for vision systems and robotics applications. We have gone before standards bodies to propose that the physical levels of the MAP protocols be expanded to include other media such as fiber-optic cable.

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Factory tool from **page 15**

speech inspection systems under a master purchase agreement.

The speech workstation, for example, would allow quality inspectors to enter their observations directly into a computer by speaking into a wireless microphone, without having to stop and write.

The unit that Intel will produce will be based upon the company's Systems 310 microcomputer. A bubble memory has replaced the rotating disk media to protect the system from many of the problems that affect rotating memories operating in harsh environments.

CSS's application, ABC Systems, is reportedly compatible with the full range of DEC's VAX and PDP-11 computers and workstations. The ABC System is an integrated, flexible tool designed for process control. Central to the system is the ABC Control Language, a specialized computer language for control and simulation applications.

The ABC Control Language can support batch processes and retains the feature of traditional programming languages for continuous processes and management information systems. It enables users to economize on programming and debugging time and expresses control strategies in simple form.

▶ MAP PRODUCT

Tester out

Tekelec, Inc. last week unveiled a portable Manufacturing Automation Protocol (MAP) simulator/analyzer that reportedly provides preconformance testing at Layer 3 (Internet) and at Layer 4 (Transport) of the International Standard Organization's Open Systems Interconnect (OSI) model.

MAP Tester allows manufacturers to analyze interactions between communications devices individually or on a network. It allows users to locate problems within their systems on the factory floor.

The basic unit costs $15,000. Software for OSI Layer 3 testing costs $5,000. Software for OSI Layer 4 testing costs $5,000. The unit will be available beginning in May.

Tekelec, Inc., 26540 Agoura Road, Calabasas, Calif. 91302 (818) 880-5656.

COMMUNICATIONS MANAGER

> *"It amazes me how fast technology is moving. Engineers always overestimate what they can do in the short term and underestimate what will happen with technology in the long term."*
>
> **Fred T. Andrews**
> vice-president of technology systems
> Bell Communications Research, Inc.

▶ MANAGEMENT VIEWS

Reach out to remote staff

Keeping in touch helps to keep far-flung employees in sync with corporate goals.

BY MARGIE SEMILOF
Senior Writer

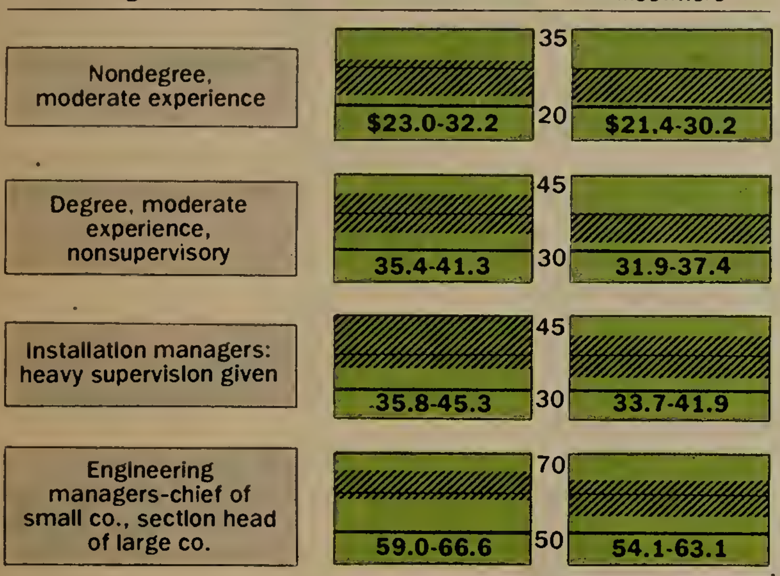
The out-of-sight, out-of-mind approach to management may serve to sabotage your corporate network if you rely on technical employees based at remote locations. Communications managers interviewed by *Network World* agree that proper coordination of remote personnel is essential to avoiding network planning problems and product procurement confusion.

Managers say the most important step a home-site communications manager can take to ensure the smooth operation of an entire corporate network is to impress upon off-site employees the company's networking goals.

Donald Augustine, director of network services at the St. Louis, Mo.-based McDonnell Douglas Aerospace Information Systems Corp., travels frequently to the company's major remote sites located in cities on the East and West Coasts. He said assuring staff members that they are part of a team is one of the most challenging aspects of managing remote workers.

Continued on page 18

U.S. telecommunications salary survey of engineers



Salary ranges in thousands of dollars

A 1985 U.S. Govt. (Bureau of Labor Statistics) survey indicated mean paid rates as follows: Engineers I (degree, little/no experience) $27,405; Engineers IV (highest without supervisory responsibilities) $40,991; Engineers V (lowest level with supervisory responsibilities) $48,366; Engineer VIII (chief) $76,205; Sr. Engineering Technician $31,386.

* Salary ranges generally represent mid-50% of data. Therefore, most management jobs in large organizations have been excluded.

Los Angeles, San Francisco, Chicago and Boston areas are above *elsewhere* ranges and below *N.Y. area* ranges.

SOURCE: PERSONNEL RESOURCES INTERNATIONAL, INC.

GUIDELINES
BY ERIC SCHMALL

Learning to plan for planning

Planning has become more complex for communications managers over the last several years. Unless we understand what has brought about this complexity and how it can be treated within an organization, the erosion of the planning process will continue. This may lead to some very costly decisions.

Planning is a simple, straightforward activity that can easily be corrupted into an incomprehensible morass whenever any of the following occur: Too many variables are introduced; too many choices are made available; the process itself involves too many actors.

When considering variables, it's one thing to plan a trip to the beach. It's quite another to establish a beachhead. People generally have an easy time in making a choice between two alternatives, for example, chocolate or vanilla ice cream. However, I've seen a seven-year-old go into decision-loop lockup when offered 31 potential flavors.

A direct correlation can be drawn between the complexity of a plan and the number of participants involved. That's the main reason that larger deliberative assemblies spin off so many committees and task forces to streamline the effort of planning. In the communications field, all of these events have combined to make the process incalculably more difficult and much more prone to serious error.

Only a few years ago, planning was made simple by the very lack of alternatives in this field. There was one long-distance carrier, one manufacturer of private branch exchanges and one provider of local service. Communications suppliers and computer manufacturers respected specific lines of product and service demarcation. Carrier services were slow to change. Tariff rates would rise, but the basic substructure remained stable. Voice was voice, and data was data. Sure, we could grouse about the restriction of choice, but there was certainly never any complaint about complexity.

Divestiture and the advent of the microchip put an end to this simplicity. Now we have a bewildering array of services and products, all equipped with varying degrees of "essential" differences. Despite the first steps toward deregulation in the industry, tariffs are constantly changing. Fewer valid distinctions can be made between voice, data, text and video; it's all information.

Everything that is being integrated in product and service offerings has a significant impact on the decision-making audience. No manager will make a decision on a significant corporate communications acquisition without getting agreement from a number of departments. Reviews and sign-offs have to be obtained from the data processing, office automation, data communications and voice segments.

We need to rethink our planning efforts if we are to avoid serious strategic errors. The planning function must take place under a reorganized, integrated communications department. This unit must aggressively seek to match its current and

Continued on page 18

PEOPLE

Richard J. Callahan was appointed group vice-president for US West, Inc. ventures. He formerly served as president of New Vector Ventures, the US West cellular communications subsidiary. Callahan will be replaced by **John E. Defeo,** current executive vice-president of New Vector Communications.

Robert Philipson was recently elected vice president of ITT Corp. He is a member of the corporate comptrollers staff and serves as comptroller of ITT Telecommunications Corp.

John Henson Jr. was named vice-president of operations for Allnet Communications Services, Inc.

Henson was most recently the director of central region operations at GTE Sprint Communications Corp.

Raymond C. Rask has joined Multicomm Telecommunications Corp. as vice-president. Rask will oversee operations, engineering and customer service.

John Petronzi has been appointed president of Centel Financial Systems, a joint venture of Centel Communications Co. and British Telecom Ltd. He most recently

Continued on page 18

Remote from **page 17**

"Central policies and procurement standards must be clearly defined," he said. "This will guide your remote staff. It will make for a smoother operation, even though it tends to limit an employee's initiative."

Ensure product compatibility by contact with remote employees

Close contact with remote employees also helps ensure product compatibility across a corporate network. Managers prefer to do most of the buying at the senior staff level. But some products, such as voice and data lines, must be bought from local carriers.

According to Ernie Florkowski, corporate manager of communications systems at the Akron, Ohio-based Firestone Tire and Rubber Co., keeping products standard is essential to achieving upper management support for the communications department's strategic plans.

"You cannot have MIS managers in remote sites buying a product that does not fit into the overall corporate networking plan," he said, "even if that product is beneficial to the individual site."

> *"Close contact with remote employees also helps ensure product compatibility across a corporate network. Managers prefer to do most of the buying at the senior staff level. But some products, such as voice and data lines, must be bought from local carriers."*

Firestone's headquarters collects data from 1,500 stores

The Firestone's Akron headquarters collects data from nine major remote locations as well as from about 1,500 stores around the country. Each remote site employs approximately 10 MIS staffers. The corporation is also building a European network where it will give onsite managers greater autonomy in managing their individual networks.

Michael Killen, president of Strategic, Inc., a Cupertino, Calif.-based consulting firm, agreed that if technical employees in remote sites are not made to feel part of an organization, they may not be able to make day-to-day decisions that mesh with the overall goals of a corporation.

"IBM pounds its goals into employees' heads through every statement made by its executives," he said.

"The Japanese also go to great lengths to do this. They may call a meeting every day to restate corporate goals. Then they ask each employee to make those goals a reality."

Killen suggests that home office managers visit remote sites as often as possible to gain a better understanding of any unique challenges faced by those employees.

Most managers agree that it does not seem to matter whether technical support professionals are employed at one data center across town or at 100 remote sites throughout the country.

Employees in remote locations suffer by missing the verbal interaction that takes place in the central network site. Senior management is also less likely to pick up a telephone or visit another shop to listen to employee problems.

Duane Heidel, communications manager at the Washington, D.C.-based Marriott Corp. and chairman of the International Communications Association, prescribes holding joint meetings to keep field staff up to date.

"Remote managers have as many problems as the people at headquarters," he said. "We hold quarterly meetings where we either bring the people in to us or send a representative out to the field. We usually spend the day sharing concepts and outlining what is going on in the regulatory and new service arenas," he added.

"Companies lose sight of their remote staff and consequently get low morale and high turnover."

Heidel explained that each Marriott site has a set of individual needs, and the corporate home base acts as a central point of coordination. Each site must purchase its own services, such as private lines. Heidel's site controls all data networking services.

"The amount of leeway you give each location depends on who is at the site," Heidel said.

"The level of staff expertise at each site differs and you must treat it accordingly."

Planning from **page 17**

future potential with the revenue-producing sides of an organization.

We can make quantitive and qualititive structural improvements by adding more time to the planning process. For large communications shops, this will mean adding a planning analyst to the existing staff. In less affluent departments, this will have to be accomplished through the careful reappointment of the current staff's time to ensure that planning is accorded its rightful share.

The scope of activities should include reviews of evolving technologies, with an eye toward the possible application to business needs and a careful watch on regulatory trends.

Schmall is network systems manager for an insurance holding company.

People from **page 17**

was vice-president, major system sales, Centel Business Systems.

John Proud was appointed the manager of Just-In-Time manufacturing at Xerox Computer Services. He most recently served as national customer education manager for Xerox Computer Services.

Nancy J. Woodhull has been appointed president of Gannett New Media Services, the research and development division of Gannett Co., Inc.

Craig M. Johnson has been appointed vice-president of product management at ADC Telecommunications, Inc.

Karl Damanda was appointed division executive of the transmission and protocol converter division at Dynatech Corp.

▶ Q&A

Low-key techniques for upper level job hunts

It may look like most high-tech job recruitment happens very visibly on the trade show floor, but that is far from the case. There are plenty of low-key job-shopping techniques available for upper level managers looking for greener pastures.

A continued shortage of communications talent still means open season on managers with the right mix of technical and leadership know-how. If you have that rare combination, a plum position will more than likely find you.

Jim Masciarelli, president of the executive search firm, Fenwick Partners in Lexington, Mass., and coauthor of several books intended to demystify the process of executive search, recently spoke to Network World *Senior Writer Margie Semilof about the role of executive search firms in communications.*

What are some myths surrounding high-tech executive recruitment?

It's too expensive. When a search is done properly, it is an extremely undervalued service because of the value the right selection can have on a company.

This is true whether you are looking for a new vice-president of engineering to bring in new product ideas, sales executives or a new chief executive officer.

There are differences in an executive search vs. the services of an employment agency. For example, we won't do recruiting on the trade show floor. Our assignments are handled as consulting projects.

What percentage of your business is finding communications managers for corporations?

Of our 48 search assignments last year, 70% were in technology-related jobs. A large portion of that figure was for data communications executives. Most of the jobs we filled were more typically on the vendor rather than the user side. There were a lot of local-area network, modem and network control product companies.

There is a larger role emerging for the data communications executive. But we find that that role does not emerge in companies under $200 million in sales.

What exactly are these companies looking for in a manager?

The ability to cope with changing technology, particularly those companies in the user community. It is too frustrating to deal with standards and vendor offerings.

These companies want people who keep up with the times. Unless they read up on what is going on, they are not a valued candidate. It is hard enough to find superlative managers. If you run across someone with technical expertise on top of that, you've got a rare talent.

Describe how a top executive is recruited.

We use a networking approach. We talk to the person about the opportunity. We follow up with correspondence. They may recommend other people who may be interested candidates.

> *"These companies want people who keep up with the times."*

We may talk to more than 200 people on an assignment. They are the clients' direct and indirect competitors, suppliers, vendors, industry analysts, editors and the alumni officials of key universities.

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Ludwig van Beethoven

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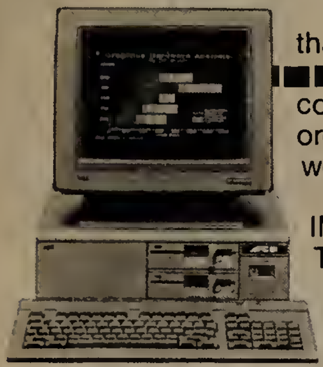

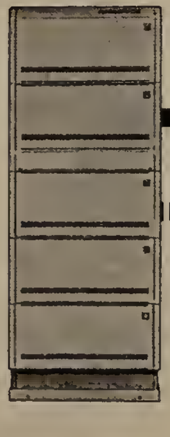

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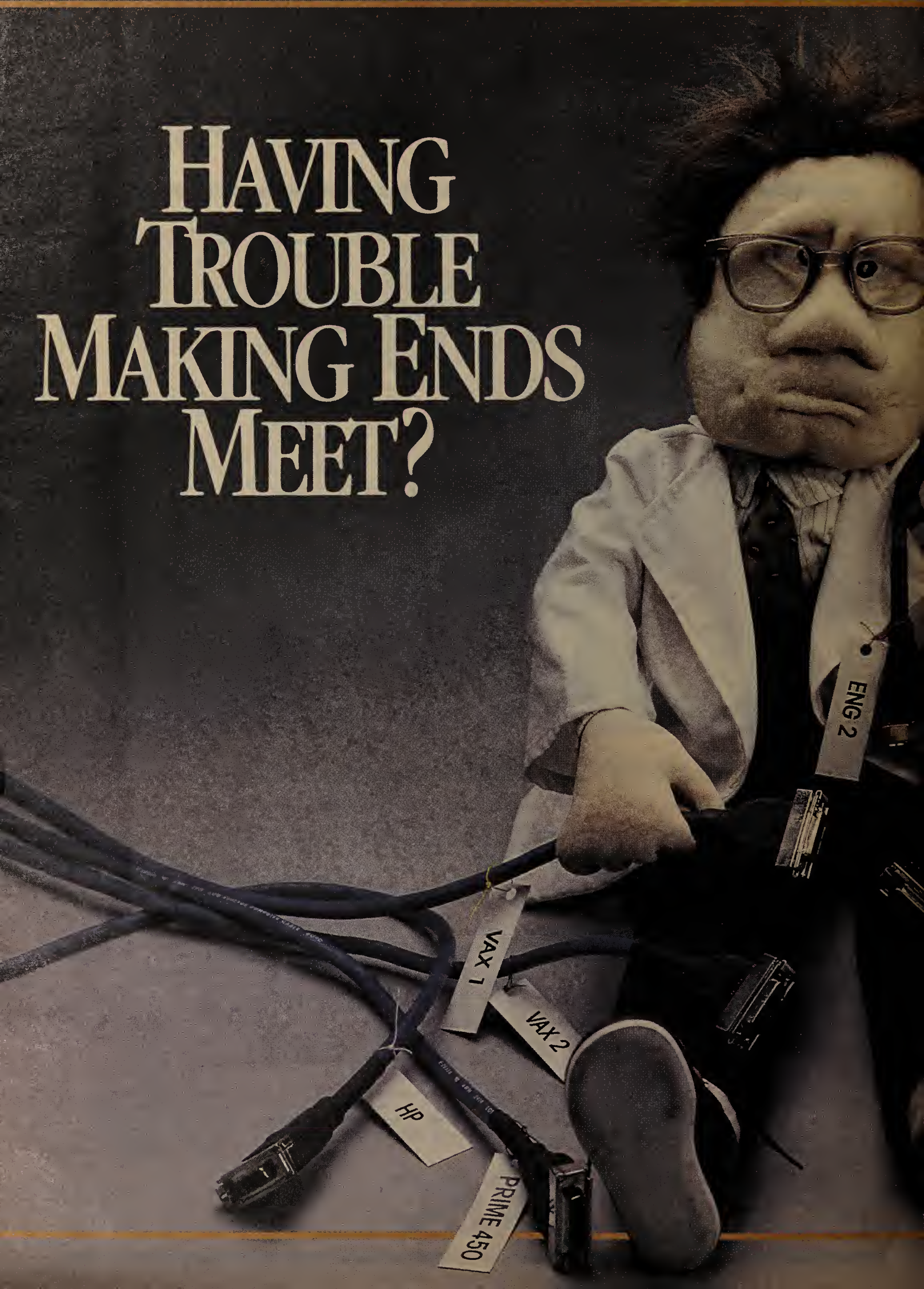
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TRENDS IN TELECOMMUNICATIONS

SPECIAL ADVERTISING SECTION, MARCH 31, 1986

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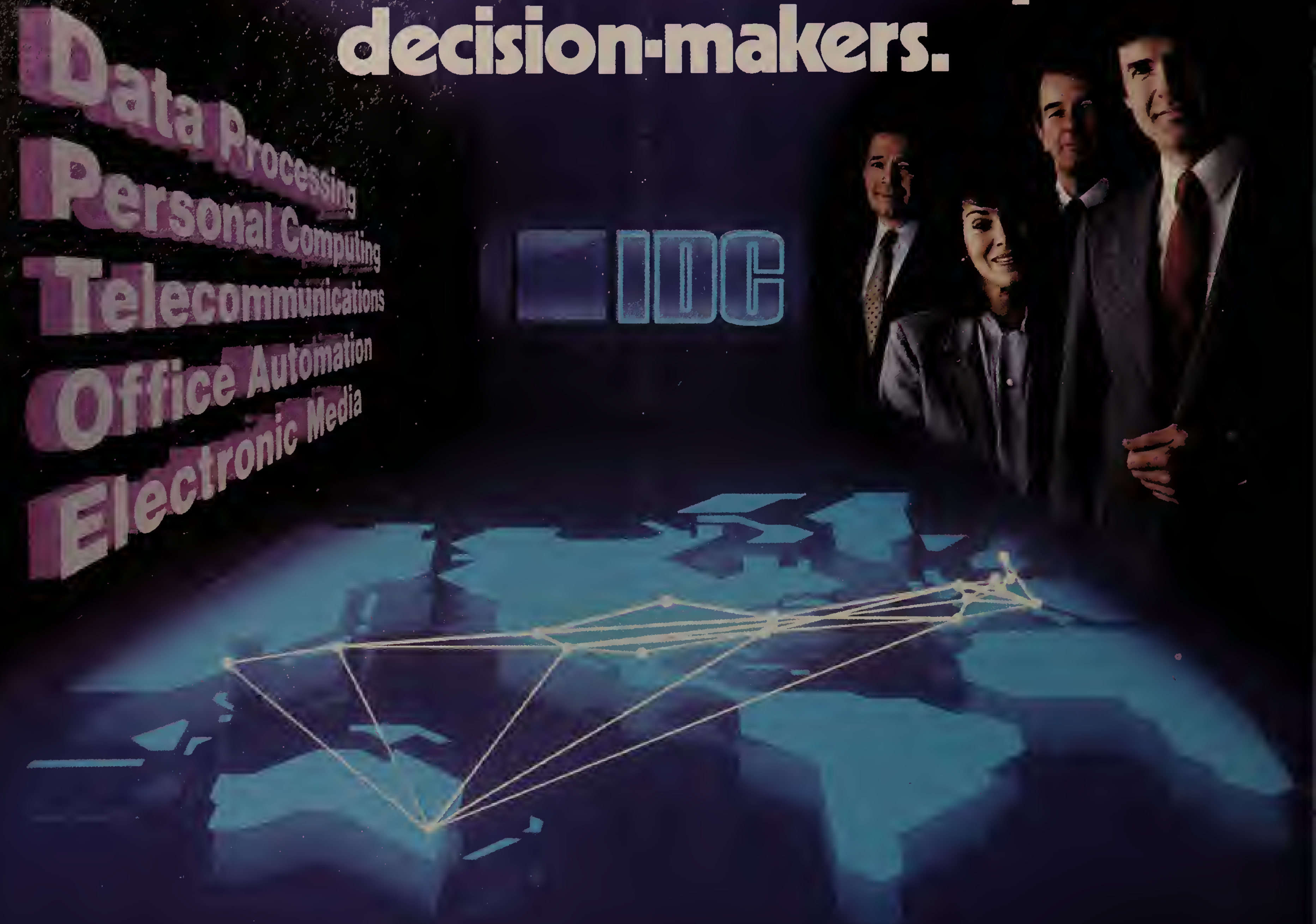

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TRENDS IN TELECOMMUNICATIONS

Technology, deregulation, and growing corporate sophistication are fomenting a revolution in business communications. Forward-thinking companies will navigate their way to the 1990s gracefully, finding ways to use the myriad new technologies as competitive weapons. The less adventurous will suffer "option shock."

The 1980s, pierced in the middle by the breakup of the Bell System, mark a period of fundamental change in the business of communicating. The 1990s will see expansion and exploration under a new infrastructure.

This White Paper to Management, prepared for FORTUNE by International Data Corporation, examines the pattern of this revolution and highlights the incredible opportunities the new environment brings.

So fundamental is the change and so fast is it occurring that contemplating tomorrow's telecommunications scene is a little like trying to score in advance the sound a thousand wind chimes would make in a hurricane. The basic notes are there, but how they piece together and sound as a whole are not.

Much of this change is taking place deep in the bowels of the infrastructure—digital switches replacing mechanical contraptions, millions of lines of software code programmed into computers, copper wire swapped out in favor of microwave radio and fiber optics—which makes forecasting even more difficult.

Yet, at this very moment telecommunications users are making assumptions about the telecommunications environment five years down the line; vendors are making billion dollar investments in technology that is still 10 years away from commercialization.

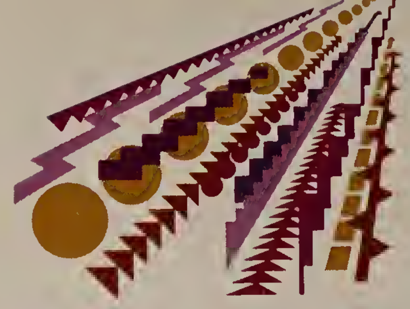
The riddles begin right with the question of which is cause and which is effect?

Are the telephone companies investing billions in new digital networks because users are demanding them? Or will the new networks, by offering new services, create market demand that doesn't now exist? Did the Federal Communications Commission (FCC) preside over the industry's deregulation to allow new technologies to thrive, or did the new technology force the FCC to dismantle AT&T's 75-year monopoly? Are markets converging in technology's wake, or is technology converging to follow markets?

Regardless of how arcane the discussion of trends in telecommunications gets, there are some clear outward manifestations of all this inner roiling. They include:

- **Demographics.** The number of digital devices in business will triple during the last half of the decade. The number of electronic keyboards will surpass the number of telephone handsets, and the number of telephones connected to digital switches will outnumber those that don't.

- **Network digitization.** During the last half of the decade the telephone companies will complete the major portion of a great overhaul of the basic network plant. Switching systems will be digital, or at least computer controlled, and all but the local loop transmission plant will be primarily digital.



Changing the network from analog to digital means the implementation of new services becomes a software exercise, not a change in hardware. It means applications can be built right into the network.

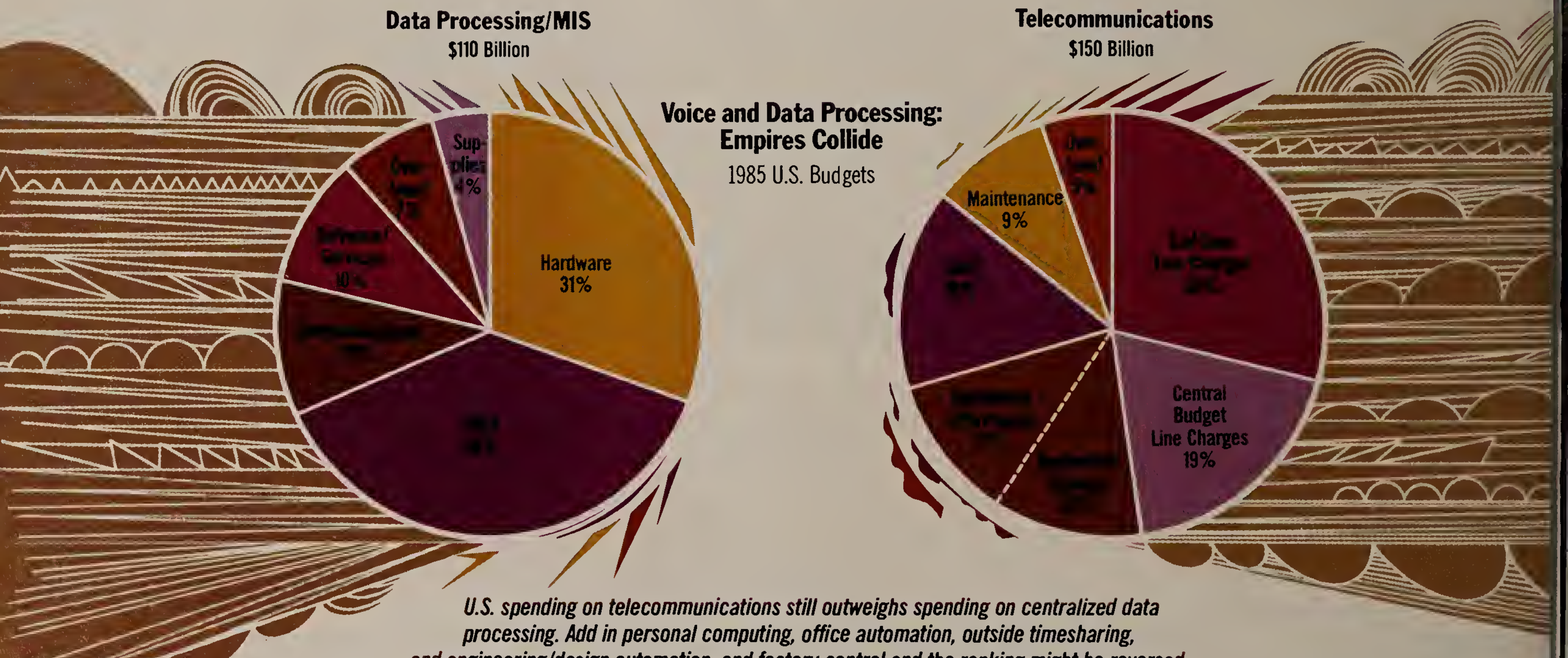
"There's no holding technology back. It goes where it wants to in the long run," says D.C. Staley, chairman and CEO of NYNEX. "We see a move toward permitting everyone in the industry to offer the full benefits of technology. And that means having networks able to provide integrated information services—networks able to communicate with each other, not a hodgepodge of fragmented networks."

- **Supplier roles.** Who supplies what to whom is changing rapidly. Although "IBM versus AT&T" competitive scenarios are generally overblown, it's clear that a number of changes are underway in how goods and services reach market.

One of the more critical links in the distribution chain is played by the local telephone companies—both those spun off in the AT&T divestiture and those of the independent telephone companies. Although these are the companies in daily touch with the market, they are also new to competitive marketing. How they fulfill their roles as distributors and systems integrators in the 1990s will affect much of how the business of business communications is conducted.

- **Standards.** The plethora of products and services that must now interrelate is pressuring the industry to set communications standards. Most of these are de facto—like the IBM computer networking scheme and Bell System telephone signaling—but some are being set by standards bodies.

What standards get backed, supported, and bought will determine much of the product capability of the 1990s. The two most important standards—if they are widely accepted—will be the one that establishes how various computer systems (including PBXs) interact and the one that will set a new transmission standard for, and more than double the capacity of, the local telephone loop.



Voice and Data Processing: Empires Collide

1985 U.S. Budgets

Data Processing/MIS

$110 Billion

Telecommunications

$150 Billion

U.S. spending on telecommunications still outweighs spending on centralized data processing. Add in personal computing, office automation, outside timesharing, and engineering/design automation, and factory control and the ranking might be reversed. Despite such budget parity, most independent surveys show that the function of telecommunications management is increasingly falling under the DP/MIS department.

Source: International Data Corporation and *Telecommunications Products + Technology*

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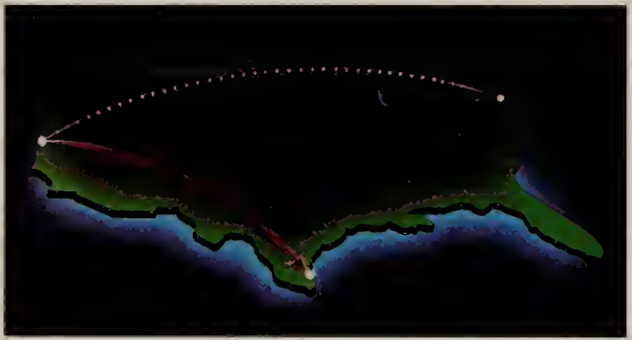

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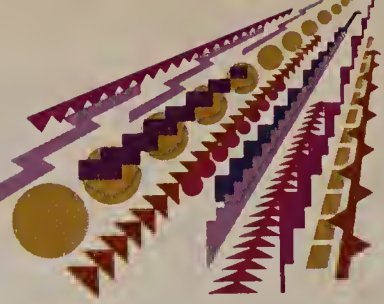
"There are clear signs that user organizations are ready for open system architecture that accommodates emerging applications and programming environments," says Edson D. deCastro, president and CEO of Data General. "The pent-up demand for vendor independence will come to a head this decade. When it does, suppliers in every sector of the industry will have to decide whether to throw up the barricades and defend proprietary architectures, or to accommodate new information technologies in an open systems architecture."

- **Management.** The art—who could call it yet a science?—of managing telecommunications within corporate entities is undergoing rapid change. Standalone departments formerly charged with acquiring phone lines and systems are being assimilated into the data processing and management information systems (MIS) departments of many companies.
- **Applications.** New communications capability, coupled with a maturing of the computing base, is driving new applications to market. Companies are now not conceiving strategic ways to use communications, but they are actually using their networks as competitive weapons.

"A proliferation of local area networks and a growing need for hierarchical information transfer will create a need for total network management and control, from the micro on up to the mainframe."

David C. Mahoney,
president,
Banyan Systems

Many such "new wave" applications stem directly from user sophistication regarding data processing. Computers are now woven tightly into the web of transaction processing by which companies conduct their business; these transaction networks, coupled with data bases, can provide powerful tools for sealing bonds between customers and company.



MARVEL AT THE HERE AND NOW

It's easy to read the trade literature and technical journals and get the impression that the truly fabulous telecommunications technology is still years away, much the way that widespread teleconferencing has always been a few years away.

Not so.

The 1970s were an incredibly fertile period for the seeding of technologies that today are bearing fruit. Some examples:

- **Satellite communication.** Domestic satellite service was pioneered in 1974 (using a Canadian satellite that year) by RCA Americom. Since then scores of satellites have been launched and today companies like RCA offer a rich array of voice and data services to business users.

Particularly useful are high reliability circuits and overseas transmission.

- **Value-added networks.** Beginning in the 1970s companies began offering commercial versions of a data transmission technology developed for the military. This technology was designed specifically to send data over standard phone lines cheaply and with low error rates. This year value-added networks will almost be a billion dollar business.
- **Digital PBXs and key systems.** Advances in switching technology, chip making, and software made in the 1970s are now firmly lodged in the private branch exchanges (PBXs) and key telephone systems of today. The latest crop of switches can handle unprecedented numbers of calls, switch data, and talk directly to other remote switches.
- **Workstations.** The first personal computers were shipped in 1978 by Apple and Tandy. Today the personal computer is the workstation of choice for office systems, and busi-

Digital Microwave for the Short Haul

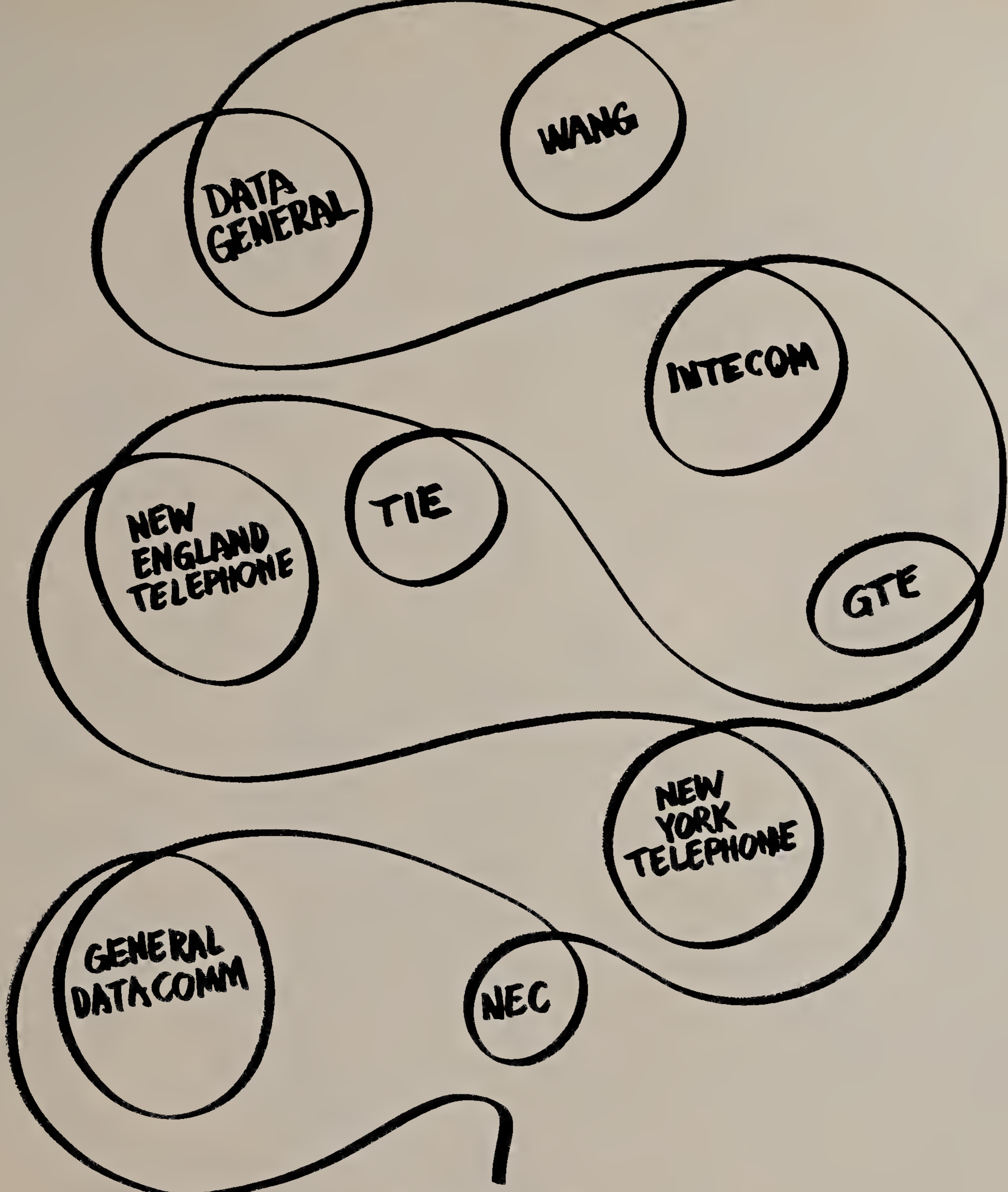
Not all distances in Texas are measured in parsecs. When the Council for South Texas Economic Progress expanded into split facilities it needed a way to send voice and data transmissions over the 2-mile distance between offices.

Since much of the Council's daily activity relies on using the telephone while having access to data files on its Hewlett-Packard HP 3000 computers, communication was no trivial matter. The Council's original idea was to lease voice and data circuits, data communications equipment, and a telephone system from separate vendors.

With the help of a local telecommunications supplier, Sentry Systems, the Council hit upon a more integrated solution. The nucleus of the voice/data system was an NEC IMS-2400 PBX to handle switching and digital point-to-point microwave system, also from NEC. Also part of the solution: a NEC Astra 215 minicomputer.

The integrated high tech solution buys the Council several things. First, overall costs are lower. Second, expansion will be easier to handle. Third, a single-vendor source helps ensure compatibility between system modules.

Private microwave systems, like those installed by the Council, are the most popular method of bypassing the local phone system. The local telephone company doesn't lose existing revenues—since local and long distance calls will still be routed through the telco—but it does lose the revenues it would have received had the Council stuck with its original plan.



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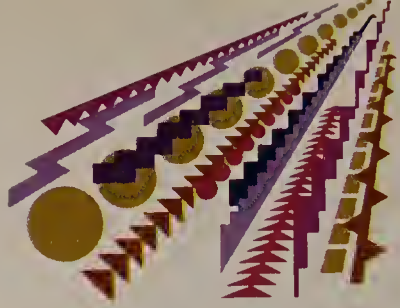
nesses have acquired over 10 million of them. By 1990 over 30 million will be used in businesses.

- **Data communications.** Prior to deregulation in the 1970s, data communications devices needed special access boxes to hook onto the telephone network. These cost money and inhibited the growth of the data communications market. Now, however, free market principles have had a decade to work—and the number of products available for hooking computers and terminals to telephone lines is in the hundreds. Along with the hardware units are increasingly more useful software programs.
- **Computer networks.** IBM's announcement of its Systems Network Architecture and Digital Equipment's announcement of DECnet in the 1970s commenced a 10-year period during which users built and operated ever larger networks using products that adhered to these networking schemes. Now those network architectures are almost universally supported and few computer sites don't support numerous remote devices.
- **Local networks.** Experiments in universities and in the labs of large companies culminated in 1980 with the Xerox announcement of its Ethernet local area network. Hundreds of companies since have joined the product brigade until now, in 1986, the local area network market is one of the hottest in the telecommunications industry.
- **Other.** Advances in software, mass storage, printing, graphics, and voice processing that began in the 1970s are now providing much of the excitement in the information processing industry. Everything from laser printers and optical disks to high resolution monitors and voice recognition systems is furthering the utility of the basic processing technologies.



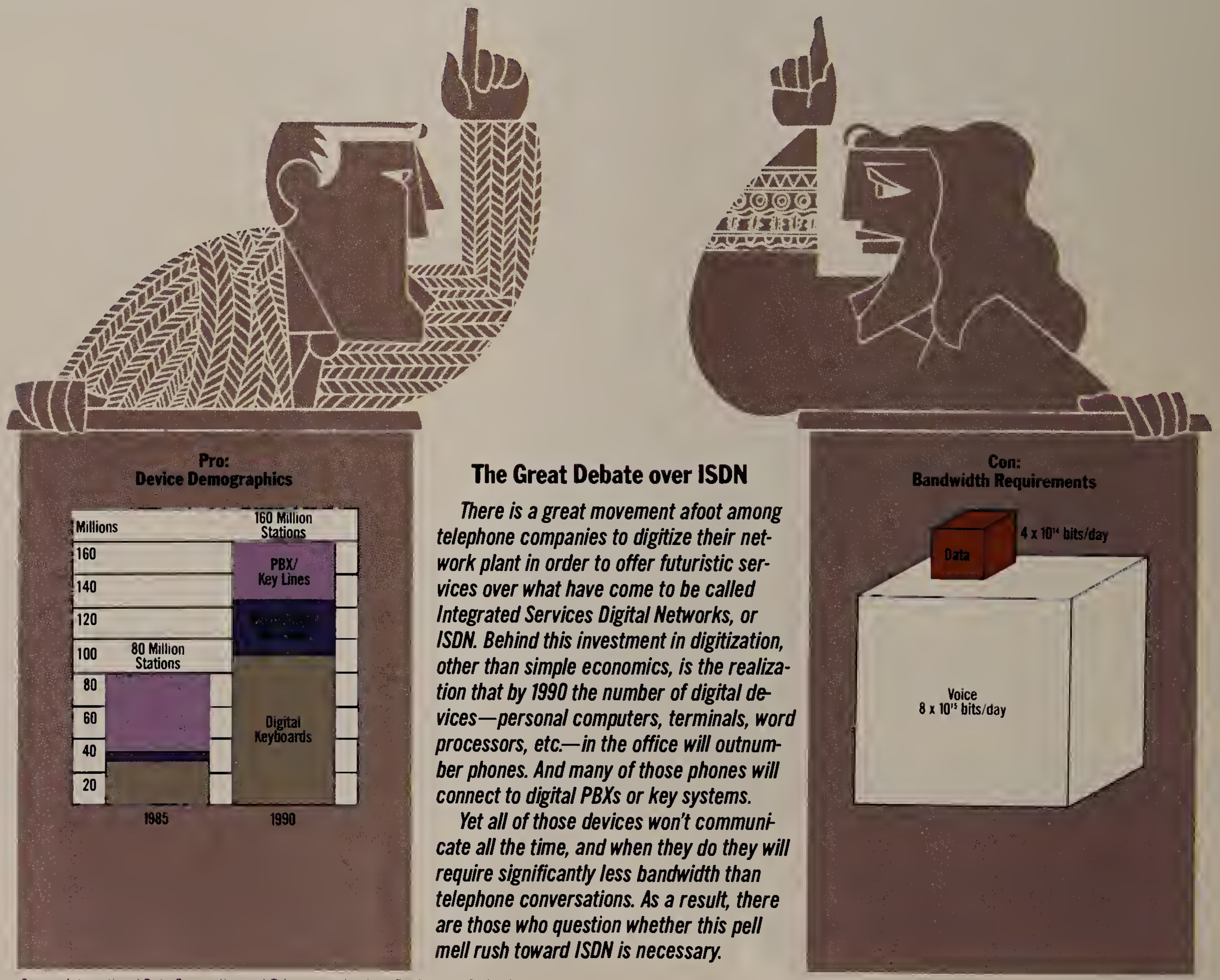
Specific examples abound. Look, for instance, at Banyan's virtual networking system. It ties together local networks of different suppliers and provides a coherent way to send data between them without requiring the user to be a technical genius.

Then there's Toshiba's Perception, a small PBX that now sports the capability of switching data at speeds up to 9,600 bits per second (reasonably fast). Or the new Telautograph Omnifax G-38, a high-speed digital fax unit that weighs only 16 pounds and can be used as a portable. It, like all Omnifaxes, can also run as a copier.

One harbinger of what the digitization of the basic telephone plant will mean is represented by AT&T Communications' offering for a "software defined network." The digitally based service allows users to share network facilities but perceive them as if each had a unique, private network.

Another example: McDonnell Douglas' Tymnet subsidiary is just this year offering a combination value-added network and satellite service that uses four-foot satellite dishes and all-digital transmission. The system will accept voice, video, and data input. The automatic connection to Tymnet's standard terrestrial service means that a wide variety of communications hosts and protocols is supported.

As Casimir Skrzypczak, vice president of science and technology for NYNEX, puts it, "Telecommunications in the 1990s will follow a road not taken."



The Great Debate over ISDN

There is a great movement afoot among telephone companies to digitize their network plant in order to offer futuristic services over what have come to be called Integrated Services Digital Networks, or ISDN. Behind this investment in digitization, other than simple economics, is the realization that by 1990 the number of digital devices—personal computers, terminals, word processors, etc.—in the office will outnumber phones. And many of those phones will connect to digital PBXs or key systems.

Yet all of those devices won't communicate all the time, and when they do they will require significantly less bandwidth than telephone conversations. As a result, there are those who question whether this pell mell rush toward ISDN is necessary.

Source: International Data Corporation and *Telecommunications Products + Technology*

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A CONFLUENCE OF TECHNOLOGIES

Looked at in broadest measure, which would see data processing and telecommunications as part of the same megamarket, the information processing industry is immense. Annual spending in the U.S. is well over a quarter of a trillion dollars. Just the long distance market in the U.S. alone brings in $60 billion to the carriers, not counting the money paid to local telephone companies for access to the local loop.

> **"It takes more than skilled sales people to sell into the office. It takes intensive sales and service training, major account support programs, financing arrangements, and, above all, service."**
> *John E. Stuart, senior vice president, Ricoh Office Products Group*

So far the part of the megamarket defined as telecommunications is still bigger than the data processing (DP) side—but not by much. The hardware markets are roughly comparable now, and spending on in-house staff has always been more for programmers and analysts than for telecommunications managers and specialists.

But the point is less the size of the overall market than the interplay between the two components.

As few as five years ago there was less than 2% overlap in the business of telephone companies and the business of computer companies. In corporations management structures followed this trend—voice system managers reported to one person, DP managers to another. Career paths in the two disciplines didn't cross.

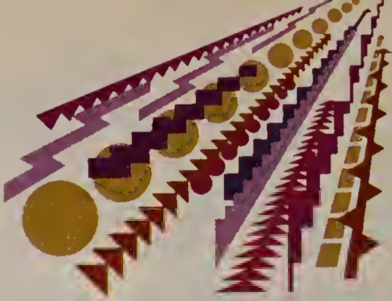
Today there's still less than 10% overlap—IBM's PBX sales are dwarfed by AT&T's line charge revenue, AT&T sells a fraction of the computers IBM does—but the markets are closer than revenue numbers would indicate.

The reason is twofold.

First, the core technology of each business is now practically the same. It is all represented by software running on digital switching devices, be they IBM mainframes, Tandy portable computers, or AT&T Technologies central office switches. The natural output of both data and voice switches is now digital.

Second, the applications from each camp are becoming more linked. Sophisticated voice services require significant computing power for control and data storage; most major computer applications require telecommunications.

An example is today's hot market for high speed "T-1" multiplexers. These are devices that can merge normal voice channels together for passage over high speed digital lines, called "T-1 carrier" in the trade. These multiplexers typically handle both voice and data input and can be justified for either voice or data transmission reasons.



On the market's surface—where these T-1 multiplexers are sold, where digital PBXs compete with local area networks, and where IBM, AT&T, and a host of other companies, including the spun off operating companies, compete for office systems dollars—it's easy to see the technological convergence.

But below the surface it may be even more striking.

In 1980, for instance, 40% of the metropolitan telephone transmission plant was digital; by 1990 over 90% will be. In 1980 only 25% of the toll switching offices were served by digital switches; by 1990 the number will be 92%.

Even the local loop is going digital. While it's easier to send digital signals by microwave, fiber optic cable, or coaxial cable, all of the phone companies are experimenting with ways to pass digital signals over the existing copper wire plant.

One of the most active is Bell South, which offers a private line digital service for local data transport, and a high-speed point-to-point service that can handle voice, data, video, and facsimile.

Meanwhile, the non-Bell companies are going digital as fast as they can. U.S. Sprint Communications (GTE Sprint), for instance has been adding digital transmission capability, particularly long distance fiber optic lines, over the past several years. Other companies have sprung up to offer digitally oriented services for everything from private networks to digitally broadcast data.

IN THE CROSSCURRENT: INTEGRATED OFFICE SYSTEMS

If there is a microcosm for this general merging of technologies it's in the market for integrated office systems (IOS).

The specific product sold is generally a license for multifunction software to run on minicomputers —vendors like Wang, IBM, Hewlett-Packard, Data General, DEC, and Sperry all play in the game.

But these software licenses are also dragging along some hardware sales with them. This year in the U.S. about 25% of medium- and large-scale systems will be shipped with integrated office system licenses, and about 15% of the installed base will have such soft-

Calling the Shots at the Buick World Tennis Championship

Handling communications for an annual sporting event is always a challenge. Systems have to be brought in, housed, tested, used, and then dismantled in a short period of time. Considering that most corporations only install new communications systems once every seven years or so, the challenge is even clearer.

Take the Buick World Championship Tennis (WCT) finals held annually in Dallas. 80,000 spectators attend, players come from all over the world, and the press and TV stations all cover the event.

Communications for the event are handled by a local company, Telemation, experienced in telephone systems. In order to accommodate all the various communications needs of the tournament last year, Telemation installed not one, but three Toshiba telephone systems—one Perception PBX and two Strata key systems. The bigger system went into the arena itself, which served as temporary headquarters for the event. Service was provided to the staff, officials, TV crews, and press corps.

The smaller systems were installed at a nearby Hyatt Regency hotel—one handling transportation and service needs for tournament players, another handling domestic and international press needs.

Despite the challenge of servicing one-time events, there is also a benefit not available to more customary business users. Vendors motivated to cooperate for highly visible one-time events may be a little more recalcitrant when it comes to serving a user daily over a period of years. And sizing and picking a system for a one-time event may actually be easier than picking a system that will have to grow over the years with a company.

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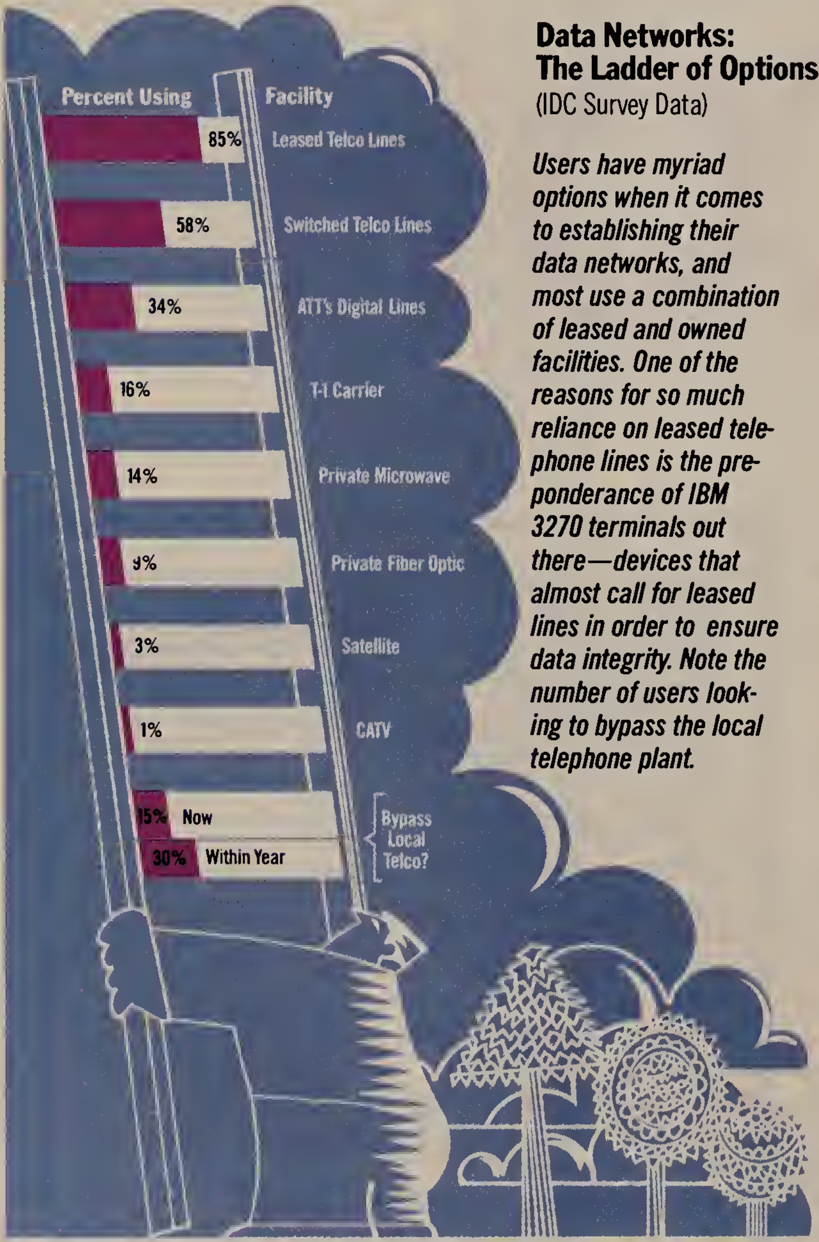
ware. In 1988 a third of the hardware shipments will go out with IOS licenses.

Growth of integrated office systems will be blistering, with shipments growing at an average compound growth rate of 45% between now and 1990.

Why such market attractiveness?

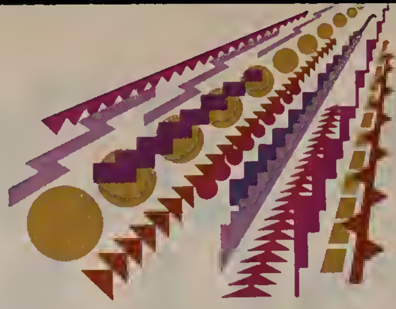
Because several reinforcing trends are driving up demand:

- User sophistication with personal computers is generating a demand for shared access to corporate data and hardware that often calls for an office or departmental computer to control information flow and processing.
- Office systems vendors, such as Wang and DEC, have turned their clustered word processing systems into integrated office systems, in essence migrating their systems along with the applications demand of users.
- The trend toward centralized management of information processing—voice, data, text, or image—is better served by larger multiuser systems than standalone personal computers.
- Growing standardization on the IBM architectures for both workstations (the IBM PC) and document transmission formats is lowering user resistance to acquiring non-IBM solutions.
- The desire is growing by users for systems that handle "compound" documents, i.e., electronic documents that include voice annotation, graphics, data base output, and text. This type of processing requires a level of computing power above a personal computer and is the type more likely to be found in a hierarchical information processing system anyway.



Data Networks: The Ladder of Options
(IDC Survey Data)

Users have myriad options when it comes to establishing their data networks, and most use a combination of leased and owned facilities. One of the reasons for so much reliance on leased telephone lines is the preponderance of IBM 3270 terminals out there—devices that almost call for leased lines in order to ensure data integrity. Note the number of users looking to bypass the local telephone plant.



THE LOCAL AREA NETWORK SOLUTION

Despite the fast growth of IOS systems, there will still be zillions of personal computers that aren't embedded in hierarchical systems. To these, local networking offers a handy way to leverage utility through communications. The object: to share files, peripherals, and messages.

Penetration of the personal computer base by local area networks is still slight—something less than 5% of eligible workstations are currently tied into local networks. By 1990, when the number of eligible workstations is within 10 million of the magic 100 million mark, that percentage will have climbed to 12%.

But there are local networks and there are local networks. And users can be hard pressed to evaluate the myriad alternatives that face them.

"A proliferation of local area networks and a growing need for hierarchical information transfer will create a need for total network management and control, from the micro on up to the mainframe," says David C. Mahoney, president of Banyan Systems.

Meanwhile, the PBX vendors are getting into the act.

Most now offer systems that can switch data over the installed phone wiring. This can be very attractive to users who have discovered the real cost in data networking is in cable installation and handling terminal moves and changes. The PBX vendors are also almost all offering some kind of integrated voice and data workstation to go along with their PBXs.

Here again we see that voice/data convergence. As long as the wires are already in place and the switches are getting more digital, why not use a PBX as the local net hub?

It's not as simple as that, of course. PBXs generally can't pass data at anywhere near the speeds of dedicated local networks, and PBXs are generally bought on price related to voice switching capabilities. Data switching is nice, but buyers tend not to want to pay a premium for it. Even by 1990, estimates International Data Corporation, less than 10% of PBX lines will be for data.

"From a product technology standpoint, expect to see a continuation of the trend toward digital based equipment that permits simultaneous transmission of voice/data communications," says Paul Wexler, vice president and general manager of Toshiba's Telecommunications Systems Division. "Also expect to find telecommunications products being introduced which will integrate with other office communications products, promoting improved office automation and productivity."

> **"There are clear signs that user organizations are ready for open system architecture that accommodates emerging applications and programming environments."**
> *Edson D. deCastro,*
> *president, Data General*

INTEGRATING THE MANAGEMENT STRUCTURE

When voice and data communications took place over separate facilities using separate technologies it was fine, in fact smart, for corporations to manage them separately.

Now it's no longer appropriate.

In fact, in order to accommodate the accelerating pace of change in telecommunications, companies are reorganizing the DP/MIS function as never before. At least that was the finding of another survey, one conducted by *Telecommunications Products + Technology* (TP + T) magazine. That TP + T survey also found that 90% of the time the manager of joint data/voice activities hailed from the DP/MIS department.

In a way, divestiture has helped this maturing process.

With end to end telecommunications service no longer available from AT&T, users have had to take charge of their own network des-

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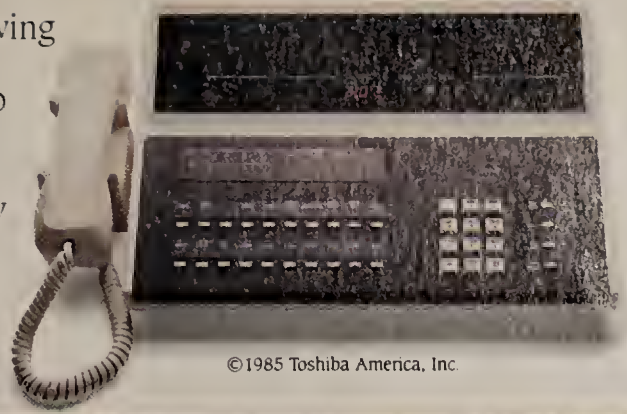

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tinies. The process of adjusting to divestiture has awakened the need for high level executive attention to information systems; deregulation is providing a potpourri of tools and solutions to chose from.

Finally, budget dollars spent on staff to handle functions once covered in phone company contracts are beginning to pay off with a new crop of highly motivated, technically sophisticated telecommunications managers.

THE PENDULUM OF CONTROL SWINGS BACK

With the advent of the personal computer in the early 1980s, control of information processing spending on the part of corporations and government agencies decentralized rapidly. End user departments, long shoved aside by MIS departments working on large, company-wide applications, bought personal computers out of their own budgets. Models of all stripe and nature rushed pell-mell into offices.

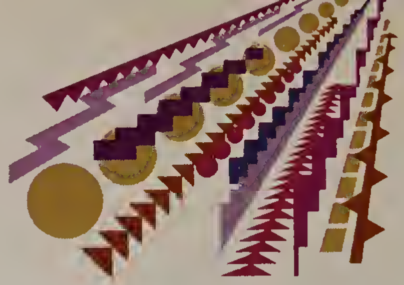
It didn't take long, though, for MIS departments to begin regaining control—they, after all, stood at the gates of the corporate mainframes and data bases. They, after all, had the technical expertise to bail out novice users.

Survey data from International Data Corporation support this view of centralization of control—almost all companies now have at least a central purchasing agency or centrally set standards for office systems purchases. Much fewer, though, report that overall company acquisitions are made according to a master plan.

For the MIS manager, this regaining of control may be a mixed blessing. At the beginning of the decade an MIS department typically had to support less than 10 end users with keyboards in their hands. By the end of the decade, that ratio will be 100 to one.

> **"From a product technology standpoint, expect to see a continuation of the trend toward digital based equipment that permits simultaneous transmission of voice/data communications. Also expect to find telecommunications products being introduced which will integrate with other office communications products, promoting improved office automation and productivity."**
>
> *Paul Wexler, vice president and general manager, Toshiba Telecommunications Systems Division*

So the MIS manager's job has changed overnight—from the care and feeding of computers to the support and service of end users.



THE NEW APPLICATIONS

From the largest conglomerate to the smallest business, the new technology and deregulated market provide some way to save money, make money, or outflank a competitor.

As the case stories in this White Paper attest, you don't have to be at the leading edge of technology to reap its benefits. You simply have to partake of it.

To begin with, companies have traditionally done such a poor job of controlling their telecommunications costs that simply organizing to install some new gear or buying systems that come with control and management features can provide quick payback. Should users *actively* go after cost control, through least-cost routing, automatic call management, computer-assisted calling, call distribution, or integrated office systems, the paybacks can be even more substantial.

As the case stories also illustrate, the applications of the new technologies are varied. Just consider:

- The New Orleans Harbor Police use an Iwatsu key telephone system that supports hands-free operation and that cuts response time on emergency calls;
- Paul Miller, proprietor of five car dealerships in Kentucky and Tennessee, uses an Executone programmable phone system to cut $4,000 a month out of phone charges through least-cost routing, long-distance authorization codes, and call accounting;
- Naval architect and yacht designer, Gary Mull, uses a Tandy microcomputer to assist in designing a yacht to challenge the Australians for the America's Cup. He consults with other naval architects and designers on his team via electronic communications.

These are the applications that save or make money. There are also applications of the new technology that make it possible to do what has never been done before.

USA Today, for instance, wouldn't be able to print nationwide were it not for high-speed facsimile transmission—a Ricoh System—that sends camera-ready material to remote printing plants. Nor would the National Association of Securities Dealers be able to run its National Market System were it not for the availability of reliable, high-speed electronic networks.

In fact, we are just beginning to see applications running far afield of past utilizations.

St. Petersburg Police Go for Portable Computing

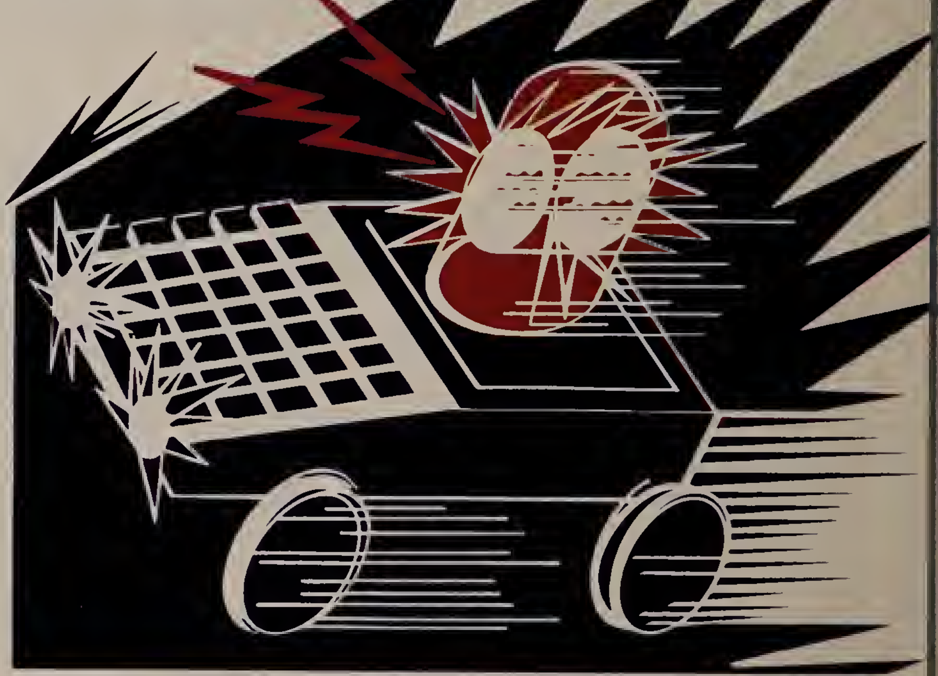
Police work isn't all the cops and robbers fare we see on TV. A lot of it is considerably less than action-packed. In St. Petersburg, Florida, for instance, just filling out "routine paperwork" means entering and processing 130,000 police reports a year.

It was a desire to streamline this activity that led the St. Petersburg, Florida, police to mount a pilot project in 1984 that entailed the use of computers on the job. Twenty officers were issued Tandy Radio Shack Model 100 laptop computers and trained to fill out reports electronically.

What a success! The use of the computers not only cut down on the time the officers spent filling out reports, but they also made for higher quality writeups.

Now over 200 officers use the diminutive computers. They fill out their reports on the scene and transmit them periodically by telephone to the department's home computer.

While the primary benefits of this type of computerization are easy enough to see—time saved, reports with less error—the secondary benefits are just as real. The growing use of computers in the St. Petersburg area is prompting the standardization of reporting, which will not only save data entry costs but will allow for more efficient sharing of data between local police departments. It also enriches the job—officers take pride in being part of a high tech, forward-thinking operation.



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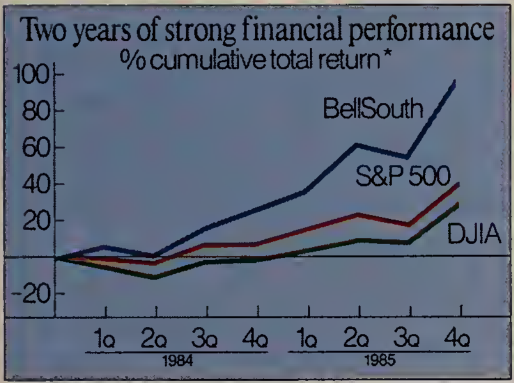
BellSouth

is two years old and growing stronger every day.

It comes as no surprise. From the day of divestiture, BellSouth has been the largest of all the regional holding companies. We have always had the strength to grow and the skills to do it.

Our strategies have been clear: to focus on telecommunications, the business we know best; to be financially driven while maintaining our consumer orientation with a commitment to service; and to pursue orderly and sensible diversification.

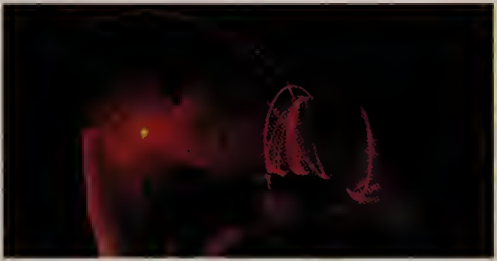


*Total return = yield + price appreciation

Sound Financial Strategies

The soundness of these strategies can be measured in a number of ways. First, financially. More than 90% of our revenues come from our two telephone operating companies, Southern Bell and South Central Bell. Their performances over the past two years have helped BellSouth stock to outperform both the Dow Jones Industrial Average and the Standard and Poor's 500 Average.

Information Age Technology



Our focus on telecommunications places us in the lead as America races into the Information Age. In this new era, when telecommunications will become the most significant part of this nation's economic infrastructure, BellSouth's $21 billion network already in place is offering our customers the leading edge of technologies.

Our investment of some $19 billion over the past seven years has produced an abundance of new products and services for our present and future customers. We are one of the leading companies in the deployment of fiber optic cable. Our customers today can have such exotic high-tech services as MegaLink,sm TouchStar,sm LightGate® PulseLink,sm SynchroNetsm and ESSX,sm which transmit voice, data or video signals over telephone access lines. These and many other new services are being marketed aggressively to our residential and business customers.

The Strength Of Our Region

And nowhere is the future more promising than in our nine-state Southeast region. We are serving the needs of one of the fastest growing areas in the nation; BellSouth companies serve a region of over 46 million people. Our population is growing 40 to 50 percent faster than the U.S. average. Net in-migration to the region totaled about 1.4 million from 1980-84, and by the year 2000, our nine states will be home to some 57 million people.

People, Promise

Though BellSouth is just two years old, we are not new at all. We inherited the legacy of two of the proudest names in the Bell System: Southern Bell and South Central Bell. We are a company of some 93,000 people whose talents and experience become evermore important as technology spawns new market opportunities for us. Accompanying that experience are financial competence and sound management, and, above all, a commitment to lead the way into the Information Age.

Two years ago, we promised that BellSouth would explore new ventures and new growth markets and that our goal was sound and profitable growth. We will continue to live up to that promise.

Learn more about BellSouth from your broker, or write: Mr. L.E. Spradlin, Director of Investor Relations, BellSouth Corporation, 675 West Peachtree Street, N.E., Atlanta, Georgia 30375. Or call 404-420-8136.

The BellSouth Companies:
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We can now make calls from airplanes, access nationwide shopping data bases by phone, receive stock quotes with hand-held devices that get signals broadcast by FM radio stations, operate nationwide paging systems, or carry our cellular car phones with us and make calls from the woods if we so desire.

The real fun comes when we realize how to use the technology to lock in our customers.

The largest Wall Street firms, for instance, are frantically putting together networks that will ship both analytical research to customers (buy/sell recommendations) and handle the actual buying transactions. Airline reservation systems, of course, have been competitive weapons for years; but now the concept is migrating to hotels, rental car chains, and other service businesses. Book and media publishers are frantically trying to capture their huge data bases and turn the distribution of information into money.

Whether this means shipping invoices electronically to suppliers, providing price lists by satellite communication, analyzing credit card transactions to drive narrow marketing programs, or providing stock quotes quicker, it means an inextricable link between information and delivery system.

THE NETWORKING OPTIONS

With the proliferation of computing power—more per machine and many more machines—the impetus to string them together electronically grows. Each day there is more data to share, more devices to share it with.

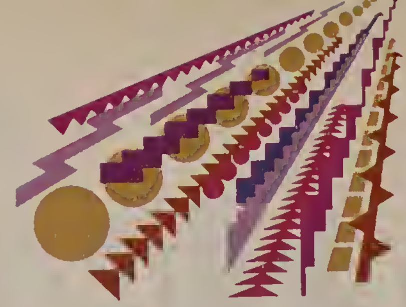
Just consider this. The first data transmission took place in 1940 between a computer at Bell Labs and a terminal at Dartmouth College. By 1970 there were still less than 100,000 devices routinely communicating with computers.

Today there are millions. And by 1990 the number of digital devices that talk electronically to one another from time to time will be somewhere near 50 million.

> **"As software gets more sophisticated, microcomputer printer manufacturers will become either the benefactors or victims of that software. As more software integrates text and graphics, more printers will be asked to handle both."**
>
> *Alex Schibanoff, national accounts manager, Brother International*

So data networks there will be. So far there are a number of options:

- **Private networks.** No one knows for sure, but AT&T has estimated that there are over 2,500 private networks in the U.S. today, many of them designed for data. Typically these use a mixture of customer owned equipment, for example microwave dishes, and leased facilities, such as long-haul voice grade circuits.



- **Dial-up network.** For users with casual or variable data transmission requirements, it is possible to send traffic over the dial-up phone network. Because the line quality and routing can be variable from one time to the next, dial-up use of the public voice network has typically been reserved for slow-speed and less vital communications, such as electronic messaging.
- **Public digital networks.** AT&T and a number of other carriers offer networks designed solely for digital traffic. Where they are available they allow users to set up networks with better error control and less costly connections than over voice circuits. These networks are rarely dial-up or even switched.
- **Value-added networks.** These are networks that use special technology, called packet-switching, that send data over voice telephone lines in fixed-block information packets. Individual packets may be routed from caller to recipient over different circuits; and the packet assembly and disassembly equipment also handles error correction. One great advantage (the value that is added) of these networks is that they use generally accepted protocols and standards, so different make computers can talk to one another. They also typically connect to value-added networks available in other countries.

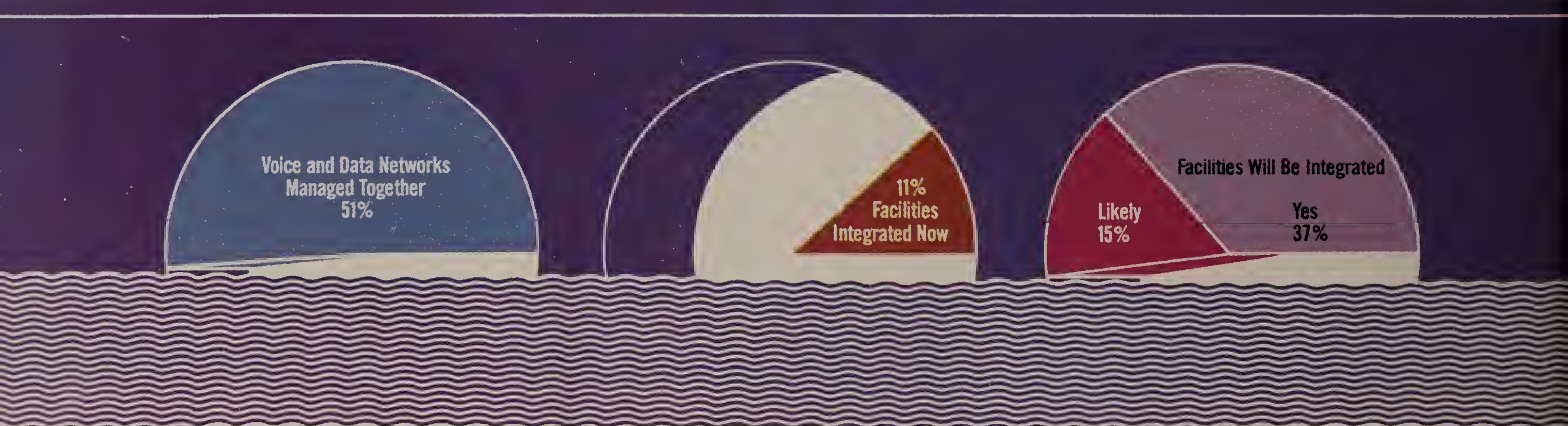
This year the value-added networks will bring to U.S. vendors over $800 million in worldwide revenues, about half from services and half from equipment sold to carriers and to companies installing private packet networks. By 1990 that $800 million will have grown to $2.1 billion.

- **Computer-based networks.** These are the networks that come as part and parcel of computer-based transaction or remote data base inquiry services. The traditional computer service industry, once characterized by walk-in centers where customers brought their punched cards for weekly processing, has evolved into a business of providing remote access to transaction processing or data base inquiry.

In fact, the traditional preserve of the computer services industry—timesharing and batch processing—is on the decline. This year those activities will account for less than half of worldwide revenues to U.S. suppliers, something greater than $12 billion, for the first time. By 1990, when revenues will be

Crossing the Voice/Data Gulf (IDC Survey Data)

More and more corporations are finding it counterproductive to manage their voice and data networks separately. First step is to put the same people in charge of both. Second is to run the networks over the same facilities. The final step? Integration of voice and data applications—1990's stuff.



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over $16 billion, remote transaction processing and data base inquiry will account for almost three-quarters of the pie.

Key vendors in this business, such as McDonnell Douglas, General Electric Information Services, and U.S. Sprint, often also offer the networking piece of their computer services separately, in which case they are also in the value-added network business.

THE BYPASS CONTROVERSY

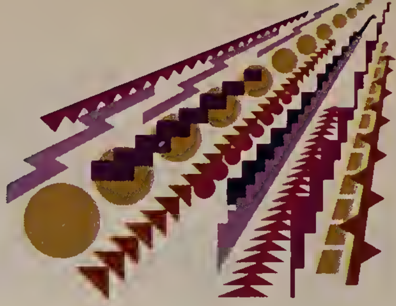
Nothing has so wrought up telephone company executives, regulators, or competitors as the concept of "bypass."

Broadly speaking, bypass is the situation where a telephone company customer uses privately owned or leased facilities to send traffic about a telephone company's territory in such a way as to cut local phone or access charges.

> **"Telecommunications in the 1990s will follow a road not taken."**
> *Casimir Skrzypczak, vice president of science and technology, NYNEX*

After that, there are a million definitions, depending on which side of an argument one wants to stand.

A broad definition, one favored by the bypassed telephone companies, would include any kind of private microwave, leased but shared circuits that cut down potential revenues, leased lines that connect directly to a long distance carrier, or even



bulk discounts offered to users who share facilities.

A narrow definition would include only customer-owned or nontelco-owned networks that replaced existing leased telco circuits to avoid line charges.

One of the rubs of measuring bypass is that the telephone companies are often party to it. NYNEX, for instance, is the agent that will help DEC install a private fiber optic bypass network. The circuits replaced will be NYNEX's own. Other times a customer might turn to a long distance carrier, such as MCI or U.S. Sprint, and ask for a direct line from headquarters to the carrier's long-distance terminus. The carrier might turn around and lease that line from the telephone company.

Thus, exactly how much bypassing is going on is not clear.

It is, however, on the rise.

One survey of large telecommunications shops conducted by International Data Corporation found that 15% of respondents are now into some kind of bypass and another 15% intend to be within a year. Other surveys indicate that over 25% of large companies—the big telecommunications spenders—are already bypassers to some degree.

Communications at the Dining Room Table

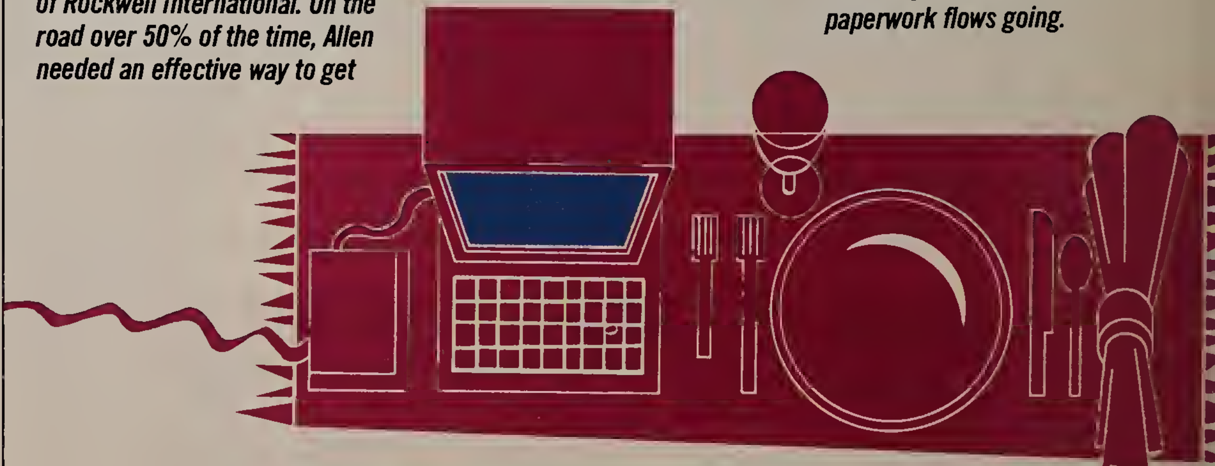
The personal computer has brought a whole new meaning to working at home. While business people have carried their jobs home with them at night for years, the personal computer has revolutionized what it's actually possible to do away from the office. Data communications are carrying that revolution one step further.

A case in point: Stan Allen, the southeast regional marketing manager for the Collins Division of Rockwell International. On the road over 50% of the time, Allen needed an effective way to get messages and reports from the office when he can stop or call in during the day. A complement of electronic assistants let's him do just that.

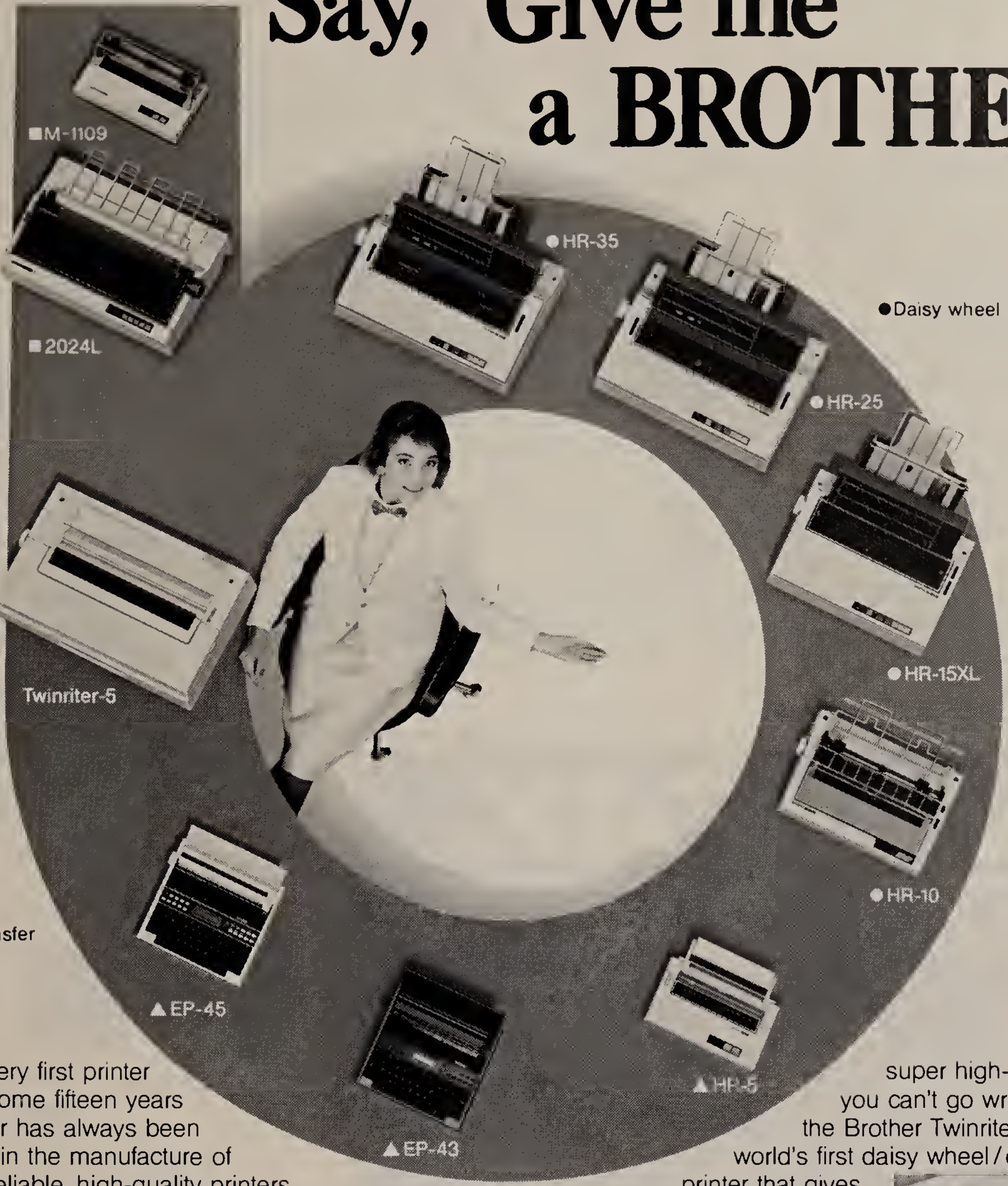
For traveling he has a portable NEC laptop computer with built-in communications capability. At home he has an Esprit terminal off which he runs applications remotely from the IBM PC on his secretary's desk.

Tying it all together is a communications software package, called Remote, from Microstuf, that allows him to establish his communications links without being a technical genius. It is also the Remote software that allows him to use his office PC from home from a terminal.

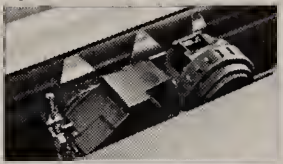
Now Allen's day is about as productive as it can be. He spends his workday meeting with prospects and clients, his commute planning his home office work sessions, and his quiet time at home getting caught up on paperwork. He is usually able to upload enough material to his secretary to keep the normal paperwork flows going.



Don't say, "Show me another." Say, "Give me a BROTHER."



Since the very first printer came out some fifteen years ago, Brother has always been well-ahead in the manufacture of extremely reliable, high-quality printers. The incredible lineup of Brother printers means we have a printer which will more than fit your requirements. If you need to send out "true letter-quality" letters, you can choose from the Brother cassette daisy wheel printers with their beautiful typefaces, or our thermal transfer printers which ensure neat, professional documentation every time. If, on the other hand, you have to print hundreds of memos and letters everyday, then we can offer you our high-speed dot matrix printers. And if you need both "true letter-quality" and super high-speed, then you can't go wrong with the Brother Twinriter 5, the world's first daisy wheel / dot matrix printer that gives you an outstanding 140 characters-per-second print-out in the dot matrix mode.



But the story doesn't just end here. Not only does the beautifully-designed Brother printer soon become the centerpiece of any working environment, but maximum versatility means that many models offer you options such as easy-to-use tractor feeders and cut sheet feeders.
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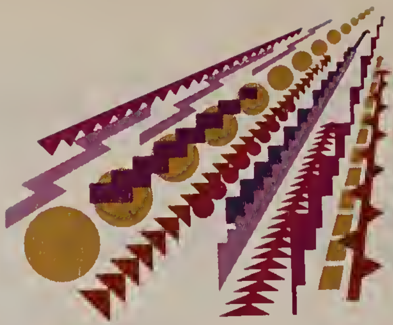

ISDN: VISION FOR TOMORROW

If there is a trend in telecommunications incipient today that will have a major impact in the 1990s, it is the rush of telephone companies to equip themselves to provide Integrated Services Digital Networks (ISDN).

Today, ISDN, the hottest acronym in the industry, is little more than a partially agreed upon international standard and a few planned field trials of certain hardware and software components.

But the ISDN dream is this: a universal international digital network with standard interfaces from the lowliest terminal to the most gigantic of toll office network switches.

As the telephone companies see ISDN, it is a multibillion dollar investment in additional switching capability, transmission plant, and software that will essentially double the capacity of the installed copper wire plant. It is also an evolution to a software-based, rather than hardware-based, network that will allow new services to be offered via programming rather than equipment design. Such new services could be as routine as data transmission without modems over standard phone lines, to medical image transmission, remote meter reading, and electronic publishing. ISDN, for instance, would allow users to know the telephone number of a caller before picking up the phone.

To the telephone companies ISDN will be the capstone of two decades of digitization.

Users will see ISDN as this: a universal wall jack into which computers, telephones, copiers, or any other electronic device may be plugged. A phone jack that handled one two-way call in the past will handle two two-way calls plus 16,000 bits of data traffic at the same time. ISDN should facilitate the interconnection of heretofore incompatible devices—assuming the standards are finalized, adhered to, and implemented. At first ISDN will represent cost savings in facilities; after that it will be the opportunity to bundle applications right into the network.

In 1986 ISDN still looks futuristic. While the number of digital terminals are increasing much faster than the number of phones, they still do not require anywhere near the network capacity as telephones. Nor will they in 1990.

But the provision of ISDN capability is, or at least should be, an incremental cost to the network digitization that is going on now anyway. An agreement on standards should merely hasten the revenues from future computer-based services the telephone companies would like to offer.

If the 1970s were a decade of technological flowering in business communications, and the 1980s the decade of rebuilding the infrastructure, the 1990s will be the decade of plumbing the digital world to its depths.

Or at least setting the stage for the turn of the century.

Text for TRENDS IN TELECOMMUNICATIONS: IMPACT FOR THE '90s was prepared by International Data Corporation (IDC), Framingham, MA, under the direction of John Gantz. Coordinated for IDC by Joseph Levy, senior vice president. Graphics: Gael Burns.

This is the 29th White Paper prepared by IDC for FORTUNE.

Other White Papers to be published in 1986:

June 23—TRENDS IN COMPUTING: BUSINESS SOLUTIONS FOR THE '90s. Ads close May 5.

October 23—PRODUCTIVITY & INFORMATION SYSTEMS: OFFICE SOLUTIONS FOR THE '90s. Ads close August 25.

November 24—THE REVOLUTION IN FACTORY AUTOMATION: THE PRODUCTIVITY CHALLENGE. Ads close October 6.

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These are just a few examples of how RCA can help you find ways to use communications to give your business a competitive edge. To learn about others, call Dick Pelszynski, (609) 987-4486 or write him at RCA, 4 Research Way, Princeton, New Jersey 08540.

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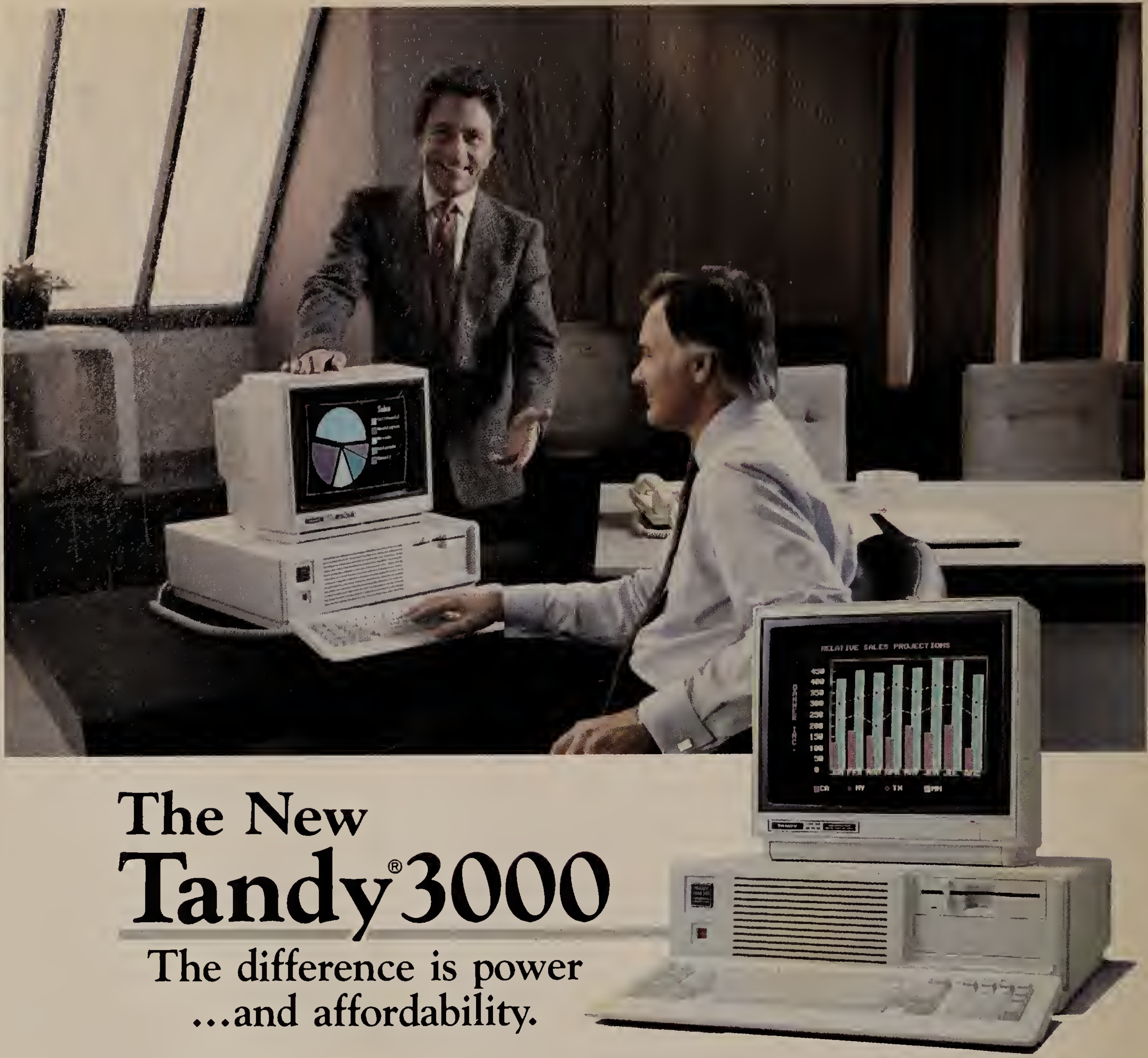

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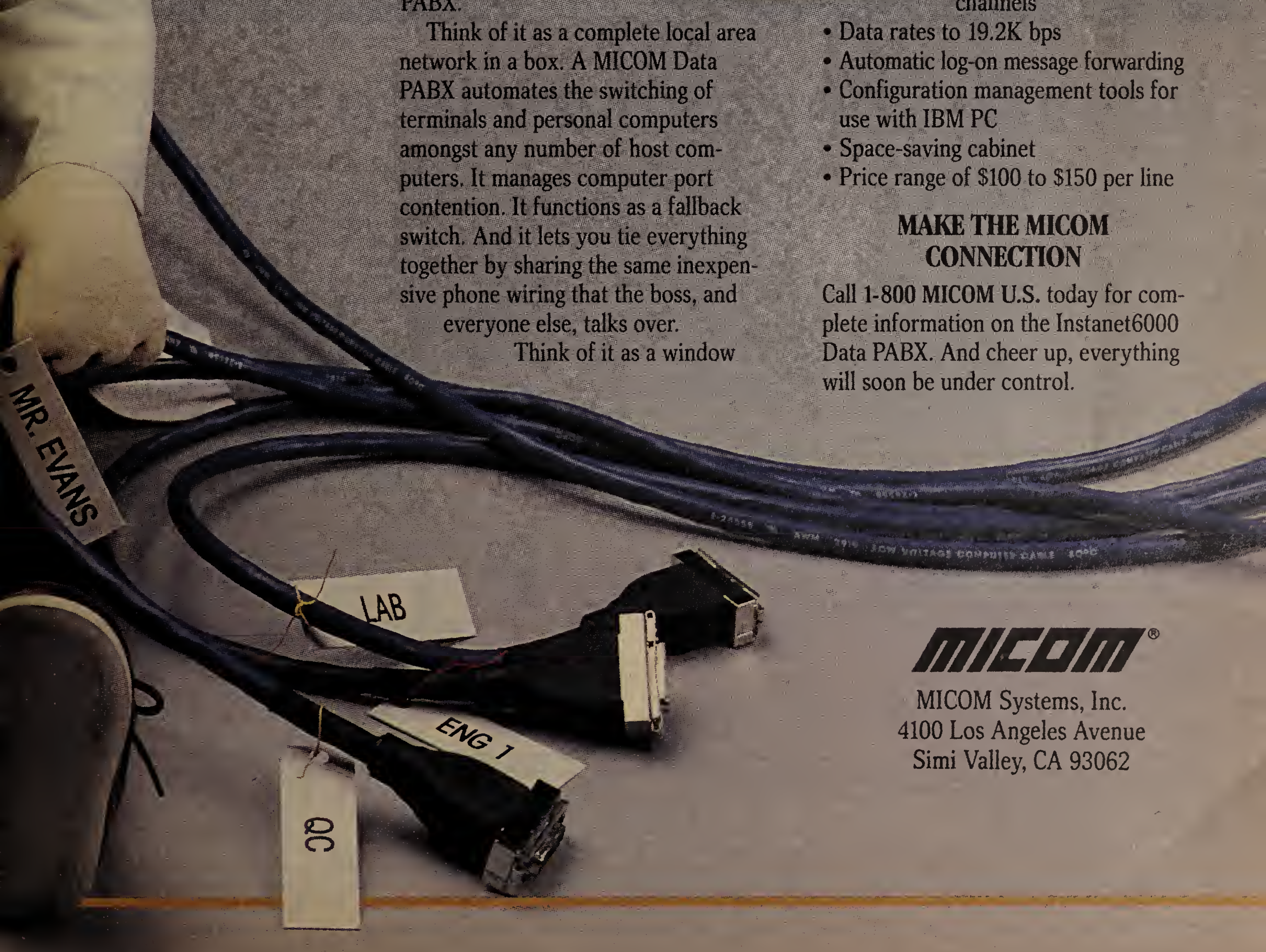

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COMMENT

BRIAN JEFFERY

The twilight ring

It's a pity Rod Serling never lived to see the token ring. It would have made a great subject for an episode of "The Twilight Zone."

It would go something like this: It is 1975. An engineer named John is hard at work on an exciting new technology called local networking. He and his colleagues have stayed up late discussing the impact this could have on the computer industry, on telecommunications, on the way people work.

John goes to bed and wakes up 10 years later in a strange hotel room at a trade show called Comdex. After some disorientation and a few bars of creepy theme music, John realizes he is in the future.

RICH TENNANT

Now he can see firsthand the great strides of information-processing technology, the fruits of pioneering work done in his time on local-area networks.

At the show, John soon notices that everyone is very excited about something called a token ring. At one Comdex booth after another, there are vendors declaring they are compatible with the Token-Ring Network. Indeed, they are declaring that they are fully compatible and more compatible than anyone else.

John is intrigued. What is this new Token-Ring? Surely it must be some high-powered, revolutionary new technology to get everyone talking like this.

John approaches a vendor, and the conversation goes like this:

JOHN: Where can I find this Token-Ring?

VENDOR: Why, ask anyone. Everyone knows about it.

JOHN: Well then, where can I see one?

VENDOR: Er, well . . . You can't. It isn't here yet.

JOHN: But all these people are supporting it. Surely someone must have one?

VENDOR: Well no. But it's the industry standard.

JOHN: What is it supposed to look like?

VENDOR: It's a star-wired, twisted-pair system that requires shielded twisted pair, but will also run on unshielded twisted pair, and operates at 4M bit/sec when it isn't running at 16M bit/sec, although it will only go for 300 meters on Types 1 and 2 cable or 100 meters on Type 3 cable; that's for 4M bit/sec, of course, unless you add wiring concentrators, but then it doesn't go as far, but of course you can always add bridges between interlocking Token-Rings, and they will test your cable to see if it will work properly, so you don't have to worry.

JOHN: What does it support?

VENDOR: Well, right now it supports IBM Personal Computers. I mean it will support Personal Computers once it's here, but it'll also support other things, really, al-

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INFORMATION SERVICES

MARK WINTHER

Diverse shops share info via EDI

Emergent electronic data interchange (EDI) systems have broad implications for all aspects of business operations. The structural complexities of EDI — which is defined as the computer-to-computer exchange of standard-formatted business information — mandate a third-party network supplier. Few companies have the resources to perform message translations or to invest in communications links with trading partners.

Paperless EDI transactions facilitate ordering of materials by reducing order lead time and eliminating manual order entry errors. EDI increases productivity by cutting inventory carrying costs and improving the scheduling of order assembly.

The recent ground swell of enthusiasm for EDI has been fueled in part by the emergence of intra-industry and cross-industry standards. Standards-defining message formats and communications protocols have to be developed to match the peculiarities of each industry. And since all organizations are both buyers and sellers, their business data flows in and out of many industries. Organizations that desire to conduct multi-industry transactions face the problem of supporting many incompatible standards.

To alleviate the problem, the American National Standards Institute designed its X12 standard to enable organizations to use a single format for interchanging data. As the X12 standards become widely accepted, Link Resources Corp. expects that Fortune 100 corporations will automate all their purchasing operations.

General Electric Co., for example, has more than 50 business units that purchase over 25,000 types of materials and services from thousands of suppliers. In 1985, GE purchases exceeded $13 billion — the equivalent of $50 million every working day. Each 1% of improvement in purchasing efficiency generates more than $100 million per year.

Currently, the bulk of EDI transactions involve purchase orders and invoices. Organizations are implementing EDI because their competition has it or their customers ask for it. But although savings in order entry costs result in productivity improvements, the big benefits of EDI are in longer term strategic advantages.

Because EDI is essentially a mailbox management function with specialized software for document and communications protocol translation, anybody with a communications network and data processing power can offer EDI services. This includes dozens of communications carriers and service bureaus.

There are a handful of companies providing these services today: Control Data Corp., General Electric Information Services Co. IBM, McDonnell Douglas Automation Co., Sterling Software, Kleinschmidt, RailInc and TranSettlements, owned by the Atlanta-based trucking firm, Transus, Inc.

There are also dozens of software houses selling EDI translator products. Link Resources estimates that 200 to 300 of these systems were installed in 1985, approximately 65% of which were microcomputer-based. Significant vendors here include Metro Mark Integrated Systems, Inc., Roslyn Heights, N.Y.; EDI, Inc., Odenton, Md.; The APL Group, Inc., New Canaan, Conn.; and Program Science, Inc., Ridgefield, Conn. To date, the most successful EDI vendor strategy has been to target specific industries.

The EDI role of public domain electronic mail services like ITT Corp.'s Dialcom, MCI Communications Corp.'s MCI Mail and Western Union's Easylink is yet to be determined. Nearly all the electronic mail vendors offer a forms capability that allows users to create and distribute common forms for soliciting the same information from multiple sources, which is a rudimentary form of EDI.

The electronic mail industry is currently heavily involved in the development of X.400 message-handling standards. While X.400 defines the means of transmitting a message throughout a network without looking at the message content, the EDI standards deal with message formats, layouts and representations.

X.400 requires little or no end-user investment in terminal equipment or software. EDI, by contrast, requires interface software to convert internal system formats to approved standards. This can cost anywhere from a few thousand dollars for a personal computer front-end configuration to millions of dollars and years of software development for a fully integrated system.

The financial community is becoming a strong proponent of EDI standards. Arguing that it does not make sense for banks to operate two separate networks — one for the exchange of value and one for the exchange of invoice and credit/debit information, large banks pressed the National Automated Clearinghouse Association to develop Corporate Trade Exchange (CTX), a new X12-compatible standard for electronic funds transfer between corporations. Companies already using X12 will be able to integrate the payments cycle via CTX. This is scheduled for testing in the fall of 1986.

Winther is director, new communications services, Link Resources Corp., New York.

though we don't quite know what or when, but it's going to be the industry standard.

JOHN: Wait a minute. You mean you're all supporting this, although it doesn't sound like a very good product and nobody's seen one?

VENDOR: Of course. It's an IBM product.

At which point, the creepy music starts again, and John begins to feel that something is very wrong. Is he crazy? Everyone else seems to find all this perfectly normal.

It gets worse. John finds that the Token-Ring is derived from Systems Network Architecture, fits with the IBM S/370 mainframe environment and is compatible with host software that was obsolete in 1975. He also learns that the industry was waiting for the Token-Ring for five years.

"IBM? SNA? 370?" John cries. "It can't be. After all this time, are we all still committed to that? That was batch mainframe stuff."

John becomes angry. "You mean to say that IBM is still foisting off the same old stuff on end users? Do the end users want this?"

A passerby turns pale. "Be quiet, you fool," he whispers desperately. "Don't you understand? We're vendors. We have to support the IBM standard. Terrible things would happen to us if we didn't."

"What terrible things?" John asks. .

"Er . . . " The passerby flees. A circle forms around John as disturbed vendors shun him. The climax approaches. John begins to shout.

"This is it?" John shouts. "After all the work on local networks, all the hopes we had that we could actually improve productivity, make things work better. Has nothing changed?"

The space around John has grown. He is alone. The camera trucks back, and the voice of Rod Serling is heard saying:

"John. An engineer. An ordinary man. And one who had the misfortune to believe that technology matters and that vendors exist to supply end users with things they really needed. But John has learned that even in the future, nothing changes. IBM is still IBM. Yesterday's architectures are today's and will be tomorrow's."

Jeffery is research director, International Technology Group, Palo Alto, Calif.

Now that we've made all our hardware compatible, let's start on the employees..

TECHNOLOGY

PAM POWERS

From reactive to proactive

Three years ago, network management and performance measurement products had only rough-hewn and limited monitoring, alarm and report-generation capabilities. Control was strictly reactive and confined to portions of the network terminating in modems native to the management system.

Today, the last vestiges of vendor and user inertia, originally generated by an ailing economy, seem to have disappeared. The result is the introduction of many new products that emphasize proactive management, reconfiguration and improved modularity.

Traditionally, network management systems have focused primarily on physical interfaces. Most still do, but their alarm and diagnostic capabilities have become more sophisticated and user-definable. Today's network management systems are now simplistically proactive — at least to the degree that they can consistently identify weak links in a network. Some systems have patching or rudimentary switching capabilities that enable them to fix, as well as to watch, the network.

"Wrap boxes" now permit modem-dependent network management systems to be used with other vendors' modems. These devices tap into both the analog and digital sides of foreign modems and typically use an out-of-band subchannel to transmit diagnostic information between the remote site and the central management system. Wraps are often expensive, and their intelligence is generally limited to monitoring the physical health of the network.

Codex Corp., Paradyne Corp., Racal-Milgo, Inc., Dynatech Packet Technology, Inc. and AT&T are the top contenders in this market. General DataComm, Inc., Infinet, Inc., Northern Telecom, Inc., T-Bar, Inc., Atlantic Research Corp. and Digilog, Inc. also have viable products.

Performance measurement systems observe transmission across the network at the protocol level. Measures of response times at the application level, as well as traffic and trending analyses, enable the user to predict problems and plan for future configurations. Avant-Garde Computing, Inc. pioneered this field, followed by T-Bar, Tesdata Systems Corp. and Electro Standards Laboratory, Inc. The technology is still in its infancy, however, and these products also fetch a hefty sum of money.

Fortunately for users, there is evidence that today's network management products are evolving toward the ideal of fully comprehensive systems that integrate what are now divergent forms of technology

The component technologies already exist: network management systems, network performance measurement systems and matrix switches. The first two provide monitoring capabilities on the physical and application levels; the latter provides dynamic reconfiguration in the event of a failure.

Although each function has merits on a stand-alone basis, large corporations with expanding networks will soon require interaction among all three. Recent announcements demonstrate growing vendor commitment to systems integration. Over the next five years, product viability will be determined by three crucial elements: ease of integration, modularity and upgradability, and competitive pricing.

Low-end management systems are dissolving the entry barriers for mid-sized corporations. NEC America, Inc., General DataComm, Codex, Racal-Milgo and Paradyne all have developed systems that cost-effectively monitor down to 20 lines — without sacrificing sophistication — for the user constrained by a smaller data processing budget.

With the inevitability of network growth within an organization, it behooves both vendors and users to start with a network management system that is easily upgradable. Integration of control, management, performance measurement and matrix switching seems inevitable, but the gap has not yet been successfully filled.

As the dust settles, product lines will be expanded through marketing agreements, and the resulting integration of functionality will be far superior to what we see today.

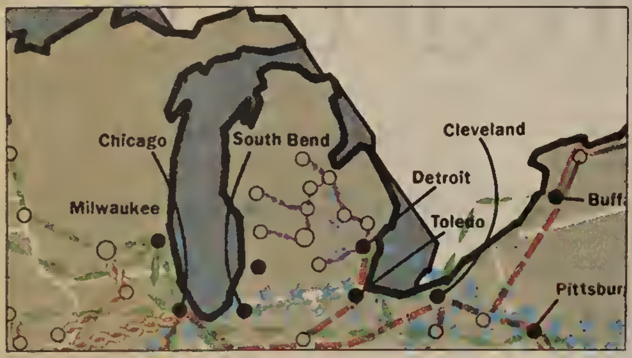
In this nascent market, the strides taken are impressive. That's good news if you need management now. It is much better news if you can wait two years to make major purchases.

Powers is an industry analyst at International Data Corp., Framingham, Mass.

NETWORK WORLD

Features

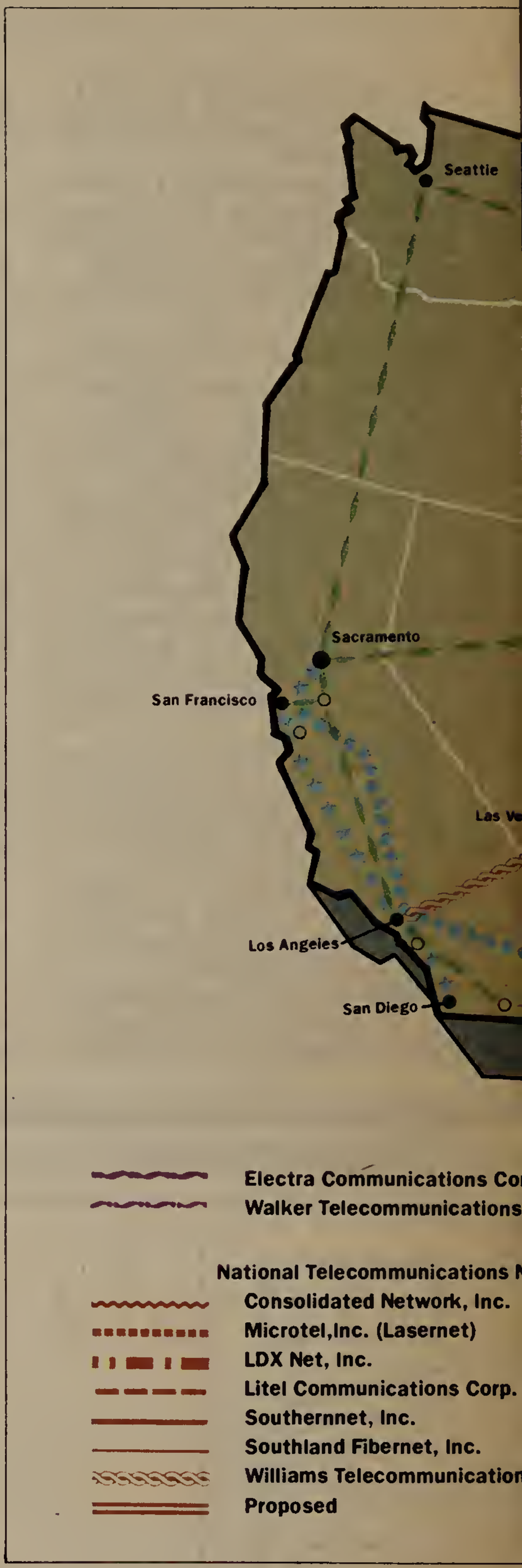
March 31, 1986



Who's got the fiber?
Remember all the speculation about a fiber glut and a transmission industry shakeout? Today, new combinations of carriers are still adding capacity and hyping their long-haul fiber nets. What's being planned? And more importantly, what's available today?
This page.

Virtual PC networks unmasked
Like magic tricks performed by amateurs, the first "virtual" networks were surprising only in their awkwardness. Today's virtual networking products are still touted as providing personal computer users with transparent access to diverse network resources — and they're still not quite what they aspire to be.
Page 1.

Voicing doubts about data
What's the most complex and expensive piece of equipment ever to gray a communications manager's hair? The integrated voice/data PBX. *Network World's* product focus illustrates why choosing a PBX is a career decision for many managers.
Page 65.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TRANSMISSION INDUSTRY UPDATE

Who's got the fiber?

With bandwidth increasing, why aren't prices falling?

BY BOB WALLACE
Senior Writer

Fiber, fiber, who's got the fiber? Better yet, who wants the fiber? A pair of all-fiber carriers is feverishly stringing fiber-optic cable across the states east of the Mississippi and parts of the Mid- and far West (see map above). Long-distance carriers such as AT&T Communications, MCI Communications Corp. and US Sprint Communications Co. continue to add, fiber stretches to their existing networks. US Sprint is a long-distance company created by GTE Sprint Communications Corp. and U.S. Telecommunications Co.

Users' reactions to the flurry of fiber carriers have been, at best, lukewarm. The lion's share of the proposed fiber builds is at least one to two years short of completion. Users stand to profit as the proliferation of fiber, coupled with a currently limited demand, should work to drive down prices of the no-longer futuristic transmission medium.

> *"The shakeout that countless industry watchers predicted would take place last year did not materialize."*

The shakeout that countless industry watchers predicted would take place last year did not materialize.

Instead, the industry consolidated. The last fiber carrier to hop aboard the bulk bandwidth bandwagon in 1984, Fibertrak, announced two delays in network construction in 1985, but would set no date for actual ground breaking of the ambitious project.

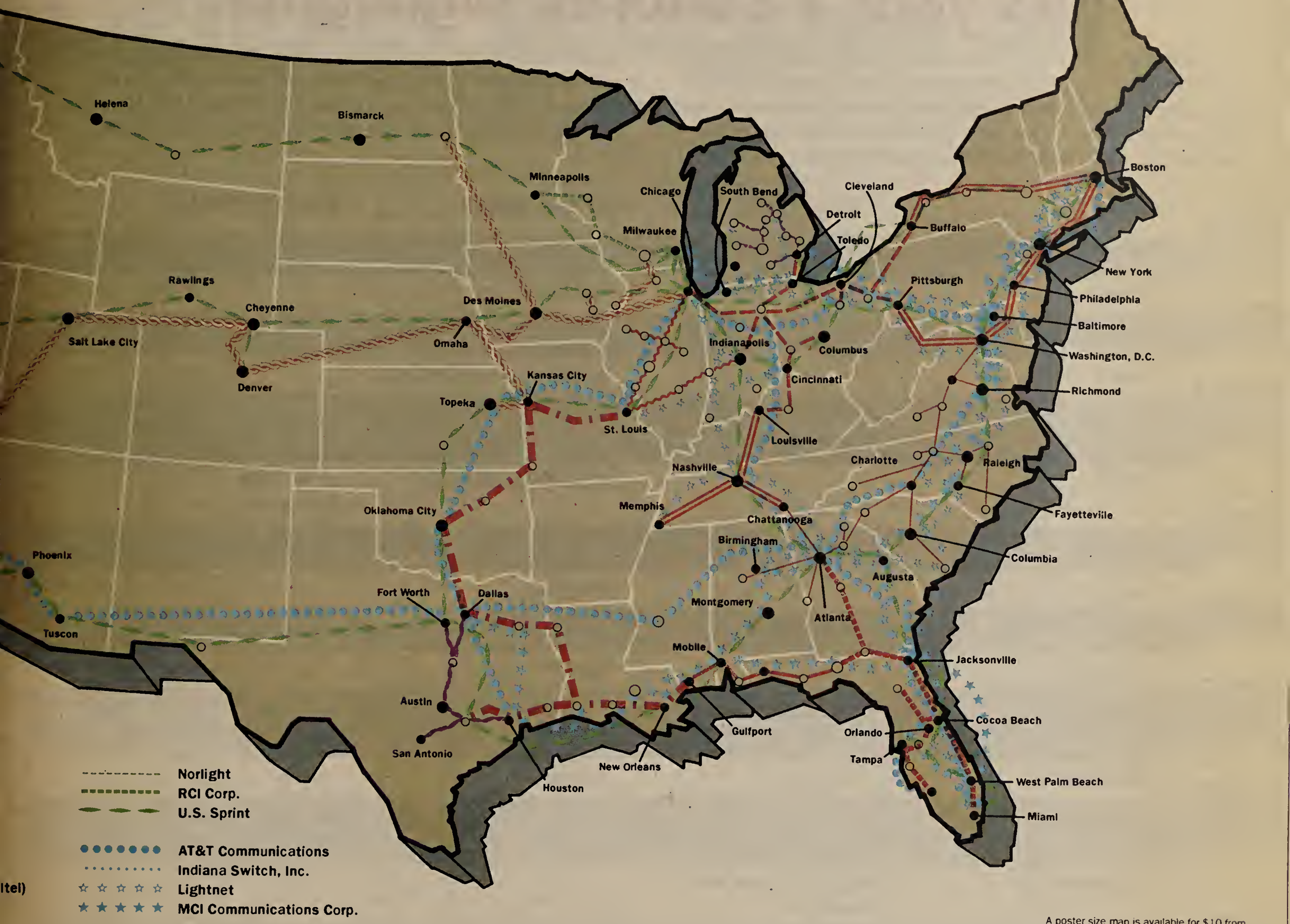
Instead of departing the long-haul lightwave marketplace, several carriers with fiber capacities pooled their resources to boost their stature in the market.

The merger of GTE Sprint and US Telecom reportedly boosts the new company's fiber resources substantially. US Sprint will market the combined fiber resources of its parents.

The increasing availability of lightwave cable will also act as a catalyst for the development of additional fiber-based services. The increased use of fiber-optic cable in major common carrier networks may eventually lower the cost of offering integrated services digital networks and increase the popularity of high-bandwidth technologies such as full-motion videoconferencing.

At present, very large communications users with heavy network traffic between a few specific locations stand to gain the most. When the

Fiberoptic long-haul systems planned and in place



A poster size map is available for $10 from Kessler Marketing Intelligence, America's Cup Avenue at 31 Bridge Street, Newport, Rhode Island 02840, USA

major carriers near completion of their long-term fiber implementation projects, they will be faced with the gargantuan task of peddling fiber capacity to smaller end users.

The long-distance fiber-optic cable market is due to peak in 1990, according to Gary Friend, vice-president of Spectrum Planning, Inc., a Richardson, Texas-based market research firm.

How long will the market grow?

Friend maintains that the long-haul cable market will increase at a 2.3% annual clip until 1990.

"At this point, all major fiber backbones will be completed," he says. By 1990, he adds, the market for fiber-optic cable in short-haul applications will be four times larger than the long-haul marketplace.

AT&T Communications became the first long-distance company to offer a tariffed fiber-optic service. Its Accunet T-45 service will be offered to end users beginning in the second quarter.

Paul Jacobson, T-45 service marketing manager for AT&T Communications, says the 45M bit/sec fiber service will be offered in 120 cities when the company's national fiber implementation program is completed in 1988.

Neither MCI nor US Sprint currently offers users a tariffed fiber-optic service. MCI spokesman John Houser says the company has approximately 3,000 miles of fiber operational, but that MCI had no immediate plans to offer a

Continued on **page 61**

Carrier name	Location	Operational miles	Total planned build
AT&T Communications, Inc.	Basking Ridge, N.J.	5,200	10,200
Electra Communications Corp.	Irving, Texas	500	500
Indiana Switch, Inc.	Longwood, Fla.	0	600
Lightnet	New Haven, Conn.	700	4,000-5,000
MCI Communications Corp.	Washington, D.C.	3,000	9,000
Norlight	Madison, Wis.	0	700
RCI Corp.	Rochester, N.Y.	815	815
US Sprint*	Burlingame, Calif; Kansas City, Mo.; Reston, Va.	6,200**	23,000
National Telecommunications Network:	Rockville, Md.		
Consolidated Network, Inc.	St. Louis, Mo.	300	731
LDX Net, Inc.	Chesterfield, Mo.	1,599	2,168
Litel Communications Corp.	Worthington, Ohio	675	1,369
Microtel, Inc. (Lasernet)	Boca Raton, Fla.	731	1,294
Southernnet, Inc.	Atlanta, Ga.	331	1,459
Southland Fibernet, Inc.	Atmore, Ala.	272	332
Walker Telecommunications Co.	Hauppage, N.Y.	0	404
Williams Telecommunications Co. (Wiltel)	Tulsa, Okla.	214	3,571

* Stated as a plan subject to the approval of the Federal Communications Commission and the Department of Justice and contingent on the completion of the merger.

** Represents operational fiber miles of GTE Sprint Communications Corp. (1,500) and US Telecom, Inc. (4,700).

All route mile numbers have been approximated. All National Telecommunications Network figures reflect operational fiber route miles as of Feb. 28, 1986.

Network World announces some of this year's editorial highlights.

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June 16	1,200 Bit/Sec Modems		
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July 21	T-1 Multiplexers		
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August 18	Network Management/ Test Equipment		
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September 22			T.C.A. Show San Diego, CA
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▶ LONG-HAUL FIBER

Lightnet struggles on

Carrier waits for prospective customers to catch up with fiber technology.

The advantage of being the first with an innovative fiber-optic service concept was not enough for Lightnet, the joint venture of Southern New England Telephone Co. (Snet) of New Haven, Conn., and CSX Corp. of Richmond, Va.

Right place, wrong time

The fiber-optic carrier was at the right place at the wrong time. Instead of driving the development of the long-haul fiber market, Lightnet has been forced to wait for its prospective customers to catch up with fiber-optic technology.

Lightnet became the first organization to announce an all-fiber communications network when it unveiled plans for a 5,000-mile, 43-city system in August 1983, five months prior to the divestiture of AT&T. The company has fared well in signing on carriers, but it has yet to announce a single fiber contract with an end user.

Art Parsons, president and chief executive officer of Lightnet, claims that the company has dramatically shifted its fiber marketing focus.

He says Lightnet can no longer be characterized as a carrier's carrier — a common carrier that sells capacity to communications carriers such as AT&T Communications and MCI Communications Corp. Parsons insists that the company has broadened its marketing scope to include corporate communications users as well as the federal government.

Lightnet began as a bold joint venture by Snet and CSX.

CSX is reportedly the nation's largest transportation company and is said to hold rights-of-way on thousands of miles of railroad tracks — a precious resource for a terrestrial network.

A novel approach

The company also had a novel approach to contracting with prospective customers for fiber capacity.

Lightnet offered customers the opportunity to lease capacity on the network in a condominium-type arrangement, which meant no monthly bills.

Another Lightnet credo was that the company would subcontract for all the network construction.

Seven months after Lightnet's creation, it inked its first contract with United Telecommunications Co. United Telecommunications agreed to be both a major customer and a primary contractor for 3,500 miles of the Lightnet system.

Cable and Wireless North America, Satellite Business Systems and RCI Corp. also signed contracts for fiber, as did many Florida-based long-distance service resellers.

The first portion of the network, running from Orlando, Fla., north to Jacksonville, Fla., became operational in early 1985. An estimated 700 miles of the 5,000-mile network is currently operational.

Parsons claims that Lightnet is looking for users who are interested in having access to a private turnkey fiber network.

Lightnet would provide such users with the fiber capacity as well as any required compression or multiplexing and demultiplexing equipment. "We are looking at multilocation corporations with the need to handle voice, data, videoteleconferencing and electronic mail on dedicated networks," he adds.

Parsons maintains that the company is targeting end users who need capacity at the North American Digital Hierarchy DS-3 level. One DS-3 channel provides 28 T-1, 1.544M bit/sec communications paths.

> *"Lightnet was the first organization to announce an all-fiber communications network when it unveiled plans for a 43-city system five months prior to AT&T's divestiture."*

"To make our fiber cost-effective, a user would need to look at leasing 12 to 14 T-1 channels for a private network," Parsons explains.

Users who are considering the acquisition of bandwidth from Lightnet must be willing to make a long-term commitment because only three-, five- and 10-year leases are available.

Parsons says Lightnet would probably fix the rate for the first three years of the user agreement and insert an escalator-type clause for following years. The rate of the capacity will remain fixed for the life of the contract, Parsons maintains.

Where are the users?

Despite the increasing availability of long-haul fiber-optic facilities, users have not swarmed to all-fiber carriers like Lightnet.

Robert Holtzman, a spokesman for Kessler Marketing Intelligence, a Newport, R.I.-based market research firm, says users may be questioning Lightnet's sincerity in selling fiber facilities to end users.

"My guess is that there's skepticism as to whether Lightnet's going to build the entire network," Holtzman says.

"It is solely a carrier's carrier. End users are an entirely different market segment."

— Bob Wallace

Continued from **page 59**

tariffed all-fiber service to its subscribers.

"We are putting fiber in place to support our own network traffic," he asserts.

US Telecom spokesman Don Forsythe echoes Houser's comments. "We plan to use fiber facilities to support our basic services," Forsythe says.

Two teams of long-haul players

Two separate groups of players have developed in the long-haul, lightwave network industry. First are organizations constructing fiber facilities primarily to support existing and projected traffic on their networks. This group includes AT&T Communications, MCI and U.S. Sprint.

The second group includes Lightnet, a joint venture of Southern New England Telephone Co. and CSX Corp., the nation's largest transportation and natural resource company, and the National Telecommunications Network (NTN), a consortium of seven regional fiber facility-based telecommunications companies created in February 1985.

Both Lightnet and the Rockville, Md.-based NTN market bulk bandwidth directly to large users seeking all-digital facilities to assimilate into their private networks.

> *"Should users expect intense competition among carriers? Probably not."*

Regional carriers in market

Two regional carriers entered the fiber marketplace in 1985. Electra Communications Corp. in Dallas and Norlight in Madison, Wis., both plan to offer fiber bandwidth to large end users.

Electra Communications, a joint venture between the Missouri-Kansas-Texas Railroad and Cable and Wireless, has completed a fiber network of approximately 500 miles that connects Dallas, Houston, San Antonio and Austin, Texas. The network is composed of single-mode 405M bit/sec bandwidth fiber cable. Electra Communications markets 90M bit/sec bandwidth chunks to interested end users in the region.

Ninety megabits per second represents roughly 58 T-1 channels, which is a mammoth amount of communications capacity that can easily support bandwidth-intensive applications including digitally encoded, full-motion video teleconferencing.

Norlight is a partnership of five utility companies that plan to build a 700-mile fiber net connecting cities in Illinois, Minnesota and Wisconsin.

Norlight President and Chief Executive Officer Jim Rice says the consortium will offer fiber bandwidth in T-1 and higher increments to end users.

Should users expect intense competition among carriers when it comes to implementing fiber-optic facilities in long-haul networks? Probably not.

The major common carriers appear to be implementing fiber as a means of supporting the expected growth in their network traffic.

John Hoffman, senior vice-president for legal and external affairs at US Telecom, says competition in the fiber marketplace is totally

☞ Continued on **page 62**

From **page 61**

dependent on equal access — a process whereby users choose their primary long-distance carriers.

"No matter how ubiquitous our fiber network becomes, we cannot compete with AT&T until we have true equal access," he asserts.

Equal access aside, over the last year one of the other common carriers has emerged as a major force in the long-haul fiber optics marketplace. The whole of NTN is greater than the sum of its parts.

The seven companies that comprise the consortium have already begun splicing their respective nets together to offer a national telecommunications service alternative to AT&T Communications.

Which comes first, the fiber or the users? (See story on page 61.) Although several carriers already have large operational fiber tracts in the ground, those groups installing fiber to offer higher bandwidth services to existing telecommunications users allow two major factors to motivate their fiber forays.

Many carriers must fully depreciate existing facilities before installing fiber facilities. The major carriers will not remove existing transmission media just for the sake of replacing them with the latest technology, whether it be fiber optics or any other.

Carriers like NTN and Lightnet have an advantage over AT&T Communications, MCI and US Sprint in that they are installing fiber, and only fiber, from the beginning. NTN and Lightnet do not have to worry about depreciating older transmission media such as analog and digital microwave, coaxial cable and satellites.

> *"Carriers like NTN and Lightnet have an advantage over AT&T Communications, MCI and US Sprint in that they are installing fiber, and only fiber, from the beginning."*

NTN and Lightnet have changed their capacity marketing strategies since their inception as fiber carriers. These companies initially planned to be carriers' carriers by pitching their capacity to established communications companies.

This game plan was changed as these potential customers claimed they intended to construct their own fiber facilities. AT&T Communications, MCI, GTE Sprint and US Telecom maintained they did not wish to relinquish control or facilities ownership to a second party.

Surprisingly, all but AT&T Communications broke their promises and have acquired capacity from either NTN or Lightnet. Both MCI and GTE Sprint signed for capacity on Microtell, Inc.'s Florida route, while US Telecom agreed to rent capacity on 3,500 miles of Lightnet's fiber net. Martin McDermott, president and chief executive officer of NTN, claims the mid-route fiber marketing change will bring NTN marketing weapons to bear on large users interested in adding nonswitched fiber capacity to their corporate networks.

"Initially our strategy was that we were going to sell predominantly to carriers," he explains. "Now we are becoming more and more involved in corporate networks."

NTN already claims to have signed Firestone Tire & Rubber Co., Goodyear Tire & Rubber Co., Mobil Corp., Exxon Corp., Westinghouse Electric Corp. and Ohio Bell to fiber-capacity pacts. NTN will rent capacity on a monthly or yearly basis in increments as small as a single voice-grade circuit, but would like to see customers rent a minimum of one DS-1 1.544M bit/sec channel, McDermott says.

NTN will also guarantee rates on DS increments for one, three, five or 10 years with a possibility of a cost-of-living increase figured in at an unspecified time, he maintains.

Advantages to be passed onto users as a result of fiber implementation in major carrier networks are expected to be minimal.

Mary Johnston, director of telecommunications research for the Boston-based Yankee Group, asserts that users that are willing to buy capacity in T-1 chunks or higher will be able to benefit from long-term fiber agreements from companies like NTN. "I don't see the increased use of fiber in long-haul nets translating into huge cuts in the cost of basic services.".

The use of fiber in other common carrier networks will help the other common carriers control their service costs and help them match any rate cuts that AT&T Communications might make, Johnston predicts. She says the typical users of fiber services would be selective members of the Fortune 500.

"Insurance, financial services and fuel companies might be interested in fiber bandwidth. [These users] would have to have the kind of traffic that would justify dozens of Wats lines and data lines."

Johnston attributes the fiber carriers short list of current users to the fact that NTN, for example, only has certain pieces of its proposed national network operational. "Users want to be sure these companies are really going to survive before they plunk down money for long-term commitments," she claims. "This represents a very big change in the way users do business."

Renting or leasing fiber-optic capacity from a carrier that does not have years of experience in marketing transmission capacity may mean the communications manager will have a tougher time convincing others that such a buy is the best one. "The user may say this looks like a great idea," Johnston says.

"But he has to sell the idea politically within his company. He might have to do a study and take it to the MIS manager, who might have to take the proposal even higher."

User interest in directly adding bulk fiber-optic capacity to their nets will increase gradually as the proposed networks near completion. This market segment will also develop if users pioneering long-haul fiber applications come forth and share their experiences with others. As the lightwave nets approach maturity, so too will vendor marketing efforts.

Lightnet chronology

Aug. 23, 1983 — CSX Corp. of Richmond, Va., and Southern New England Telephone Co. of New Haven, Conn., agree to operate and maintain a 5,000-mile fiber network.

Early 1985 — Satellite Business Systems signs a contract for fiber capacity on the Lightnet system.

March 13, 1985 — US Telecom, Inc. announces that it will be a major customer and as well as a primary contractor for 3,500 miles of the Lightnet system.

May 2, 1985 — Americall LDC, Inc. of Jacksonville, Fla., signs a contract for fiber capacity on Lightnet.

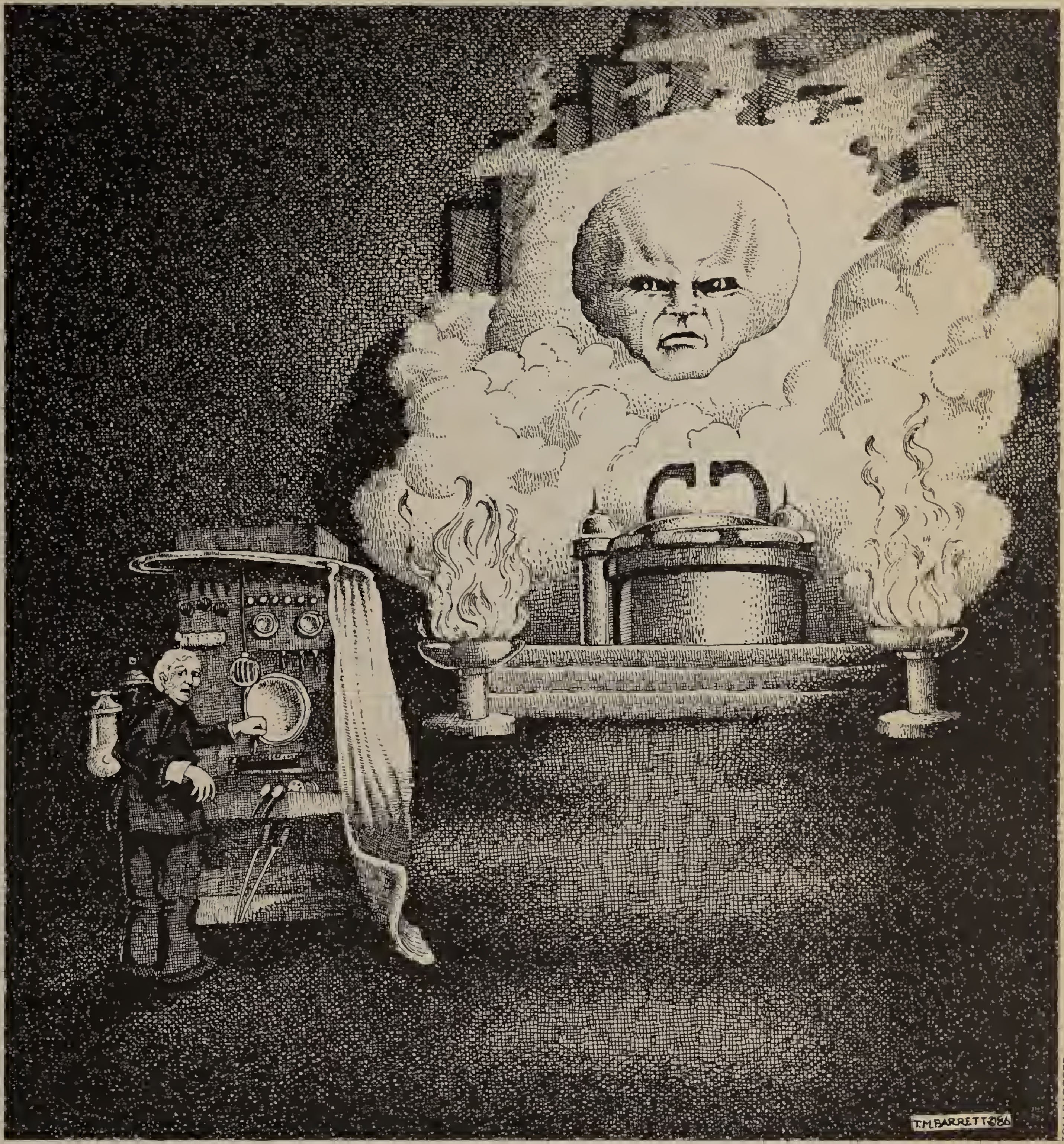
May 20, 1985 — Cable and Wireless North America signs a contract for fiber optics on the Chicago-to-Washington, D.C. run, with plans to make it operational by 1986. FCC rules that Lightnet will not be regulated as a common carrier.

July 2, 1985 — RCI Corp., a subsidiary of Rochester Telephone Co., signs for capacity between New York and Washington, D.C. Expected completion date is late 1985 or early 1986.

Dec. 19, 1985 — Art Parsons, former executive vice-president of Lightnet, is named president and chief executive officer.

▶ CONTINUED FROM PAGE ONE

Virtual PC nets laid bare



TOM BARRETT

vice-president of marketing for 3Com Corp., a vendor of personal computer networks in Mountain View, Calif. "Users want to view data in personal computer networks and corporate networks in the same way that they view data in their personal computer. And they want the network to provide it for them."

"Virtual" is somewhat of a misnomer. "Virtually" may be a more fitting descriptor. Vendors of personal computer networks are not, after all, professing to be able to interconnect micros, minis and mainframes with different types of operating systems.

> *"Byte locking ensures file integrity by blocking access to a file while someone is using it. It is the most sophisticated type of locking, because it enables control of bytes, not just file locking."*

In fact, most personal computer net vendors only provide full networking support for IBM-compatible personal computers, and perhaps one other type of micro and associated operating system.

When mainframe links — another key element in the virtual net concept — are discussed, IBM is far and away the most often mentioned environment.

Within this realm, all the pieces are falling together.

Vendors are packing more horsepower into their network servers so that the devices can roam the network, instead of requiring the user to have an intimate knowledge of its structure. And this year, we will begin to see interest in network-to-mainframe links that are something more than traditional gateways providing terminal emulation.

To be sure, virtual networking seems more than a light-year away for the typical user, who has five to 10 personal computers sharing a hard disk and a printer.

Walk before you run

You have to walk before you can run. These users are not even realizing the full potential of their networks because of the lack of multiuser applications designed for network use.

That is changing. According to Gerald Van Diver, president of Micro Information Publishing, Inc., a market research company in Minneapolis that tracks microcomputer software, applications for network environments constitute the fastest growing segment of the microcomputer software industry.

This unparelleled growth is largely attributable to the creation, about a year and a half ago, of a de facto standard microcomputer operating system environment.

MS-DOS 3.1 is the latest version of the operating system that Microsoft Corp. licenses to IBM and manufacturers of plug-compatible personal computers. It includes, for the first time, a set of system calls for networking.

System calls facilitate the job of developing multiuser applications by eliminating the need to write programs directly to the hardware, according to Dave Melin, Microsoft's product and market manager for DOS and networks.

A programmer writing an application could, for example, add a routine to save a file to disk by accessing that system call, instead of having to fully understand the disk controller and the way the disk is segmented.

Besides simplifying the development task, writing applications to MS-DOS 3.1 obviates the need to adapt programs to run on different networks. Both of these advantages have spurred development efforts.

"Software developers can now write multiuser applications to a standard rather than a specific network as they once had to," says Buonauro of 3Com.

Built-in security

MS-DOS 3.1 also provides a built-in method to secure data for multiuser applications, an important networking concern. Software developers can employ the operating system's byte-locking capability to prevent users of shared files from writing over one another's file updates.

Like file and record locking, byte locking ensures file integrity by blocking access to a file or file segment while someone else is using that file. It is the most sophisticated type of locking because it enables control of specific bytes, not just the locking of entire files or records within those files.

The locking issue is "one of the biggest holdups for local network proliferation," according to Karl Kendall, manager of the information center at Metropolitan Life Insurance Co. in New York.

"People are used to stand-alone products and applications. Before the advent of DOS 3.1, locking was not generally available." Where it was available, it "didn't work with some of the major software products."

While DOS 3.1 does not preclude the use of

Continued on page 64

From **page 63**

existing network applications with file or record-locking capabilities, these programs will have to be updated to take advantage of the new byte-locking ability.

Taken together, the new networking capabilities and industry backing of MS-DOS 3.1 will "break loose the local network area for personal computers," in the words of William A. Lanfri, director of marketing for Corvus Systems, Inc.

Others agree. "In 1986, we will see scads of new programs for personal computer networks" based on the operating system, according to Louise Herndon Wells, an industry analyst with Dataquest, Inc., a San Jose, Calif.-based research firm.

While MS-DOS 3.1 paves the way for multiuser applications, it does nothing to connect a micro to a network. That requires a complementary network operating system. Microsoft's network operating system is called Microsoft Networks (MS-Net). MS-Net was developed concurrently with MS-DOS 3.1 and is tightly coupled to that operating system through specific system hooks, Melin explains.

MS-Net's net server software

Like other network operating systems, MS-Net controls communications across the network and provides, among other things, software for network servers.

Servers are devices dedicated to the task of providing shared access to hard disk storage and other peripherals, like printers and modems. Some networks enable users to share the hard disk of an attached personal computer, although this type of implementation is becoming rare.

Many computer vendors have licensed MS-Net as their network operating system, while other network manufacturers have opted to employ part of the system or develop their own. The most popular individual segment of the modular MS-Net is the redirector. It includes server software, provides for print spooling and offers a common command set for networking.

The redirector is, according to Melin, "responsible for redirecting disk requests across the network instead of to a local disk." 3Com's recently announced 3Plus software, for example, is built around a Microsoft redirector, but uses its own server software.

Personal computer network vendors try to differentiate themselves in server technology and related software, where the crossover point to virtual networking may eventually be made.

In the continual evolution of server technology, two relatively new capabilities have gained attention. The first is the ability of network servers from one vendor to support nets from other vendors; and the second is the ability to insulate users from cryptic network commands by increasing the intelligence of network servers, thereby reducing the complexity and level of expertise required to use networks.

Servers capable of interconnecting different kinds of networks are not necessarily capable of supporting micros that have different operating systems; they typically only support IBM and compatible DOS machines and perhaps one other operating system environment.

3Com's 3Server, for example, supports IBM Personal Computers on Ethernet and Apple Computer, Inc. Macintosh micros over Appletalk networks. Buonauro of 3Com said her company also intends to support IBM Personal Computers through the IBM Token-Ring Network.

Banyan Systems, Inc., a Westboro, Mass.-based company, supports a broad range of networks from its server, including: Corvus Systems, Inc.'s Omninet; Orchid Technology, Inc.'s PCnet; Datapoint's Arcnet; Proteon, Inc.'s Pronet; standard Ethernet; and IBM's PC Network. But it only supports PC-DOS and compatible machines.

Both 3Com and Banyan can swap files between network types in their respective environments, although it is much easier for Banyan because it supports homogeneous operating systems.

"In the continual evolution of server technology, two relatively new capabilities have gained attention. The first is the ability of network servers from one vendor to support nets from other vendors; and the second is the ability to insulate users from cryptic network commands by increasing the intelligence of network servers, thereby reducing the complexity and level of expertise required to use networks."

Translating files from one operating system environment to another is technologically feasible, but too resource-intensive to offer on a large-scale basis. Companies that offer the feature typically do it between only two operating systems, as 3Com does for Macintosh and MS-DOS-based machines.

Vendors that claim they can support multiple operating systems on the same network are usually selling disk serving systems. Disk serving entails segmenting a hard disk into volumes that are dedicated to specific machine types. File sharing between volumes is typically limited to Ascii data transfers, if provided at all.

Such implementations typically do not provide the translation needed to transfer binary files. For example, a Visicalc spreadsheet created under the CP/M operating system usually cannot be transferred to a Lotus Development Corp. Lotus 1-2-3 spreadsheet under PC-DOS.

The ability to interconnect networks from the same server does not mean much if the user needs an advanced degree in computer science to take advantage of the capability.

Banyan goes out of its way to integrate networks for users as transparently as possible. Jim Allchin, Banyan vice-president of software, explains, "My Personal Computer can be connected with a [Proteon] Pronet to a server that also supports Ethernet, Arcnet and Omninet. None of my files are on that server. My data is two servers away, but that is completely transparent to me."

Eric Killorin, president of Hyatt Research Corp. of Andover, Mass., and publisher of PC Netline, an industry newsletter, expands on the concept.

"If you're on an Ethernet and I'm on a Token-Ring, I want to be able to send you a file by just typing in your name. I don't want to have to send the file to a particular server, say 'Server B' on the Token-Ring, and once it's there, log back on and go into the server, and, with a different set of cryptic commands, send the file — which probably has a different name now — to the server on the Ethernet."

Allchin and Killorin are talking about virtual networking at the personal computer network level. Banyan even describes its architecture as the virtual networking system, or Vines.

Extending this transparency out of the microcomputer network realm will be the final piece needed to complete the virtual network puzzle. It will depend on a more sophisticated link than today's typical gateway, which provides IBM 3270 emulation.

"Users don't want to have to go into 3270 emulation and appear to be an IBM terminal to access the host, and then go back into PC mode," Buonauro of 3Com says.

The industry is looking to IBM's LU 6.2 Advanced Program-to-Program Communications protocol to provide a more elegant and useful link method.

"LU 6.2 is a contribution in the direction of virtual networks," Buonauro says. "It provides a peer-to-peer interface to the network."

Lanfri from Corvus agrees. "For virtual nets, you need to see more widespread adoption of LU 6.2 from IBM. That will help quite a bit."

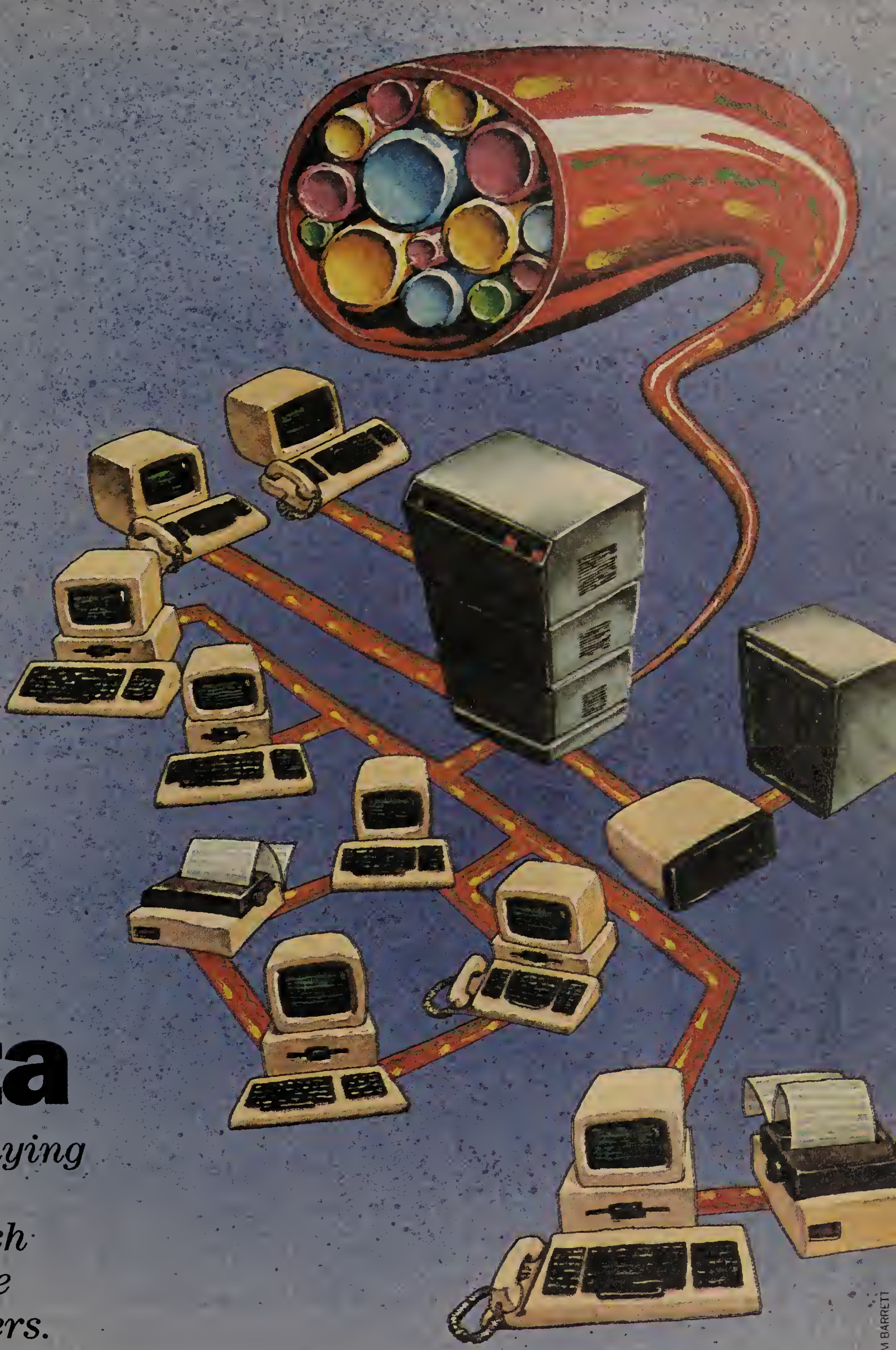
Although Banyan, like most companies, bases its host link on 3270 terminal technology, it complements the connection with host-resident software that provides the illusion of transparency, Allchin says.

He admits, however, that this is a jury-rigged solution. "3270 is pretty baroque. With LU 6.2, we will be able to make the connection faster and do it with more machines, like IBM System 36s and System 38s, not just IBM mainframes."

All agree that virtual networking will be a long time coming. Killorin of Hyatt Research puts it in perspective.

"Most people are using networks to hook up seven or eight personal computers to share a resource. And usually that resource isn't even information; it's storage or a printer. A lot of today's networks are overkill even for that environment." ◘

"MS-Net controls communications across the network and provides, among other things, software for network servers. Servers are devices dedicated to the task of providing shared access to hard disk storage and other peripherals, like printers and modems. Some networks enable users to share the hard disk of an attached personal computer, although this type of implementation is becoming rare."



TOM BARRETT

▶ HIGH-END VOICE/DATA PBXs

Voicing doubts about data

Selecting and buying an integrated voice/data switch is quite a gamble for most managers.

BY MARGIE SEMILOF
Senior Writer

Buying a high-end voice/data private branch exchange is a lesson in firing at two moving targets. The first is a volatile switch market riddled with incompatible technologies and nonexistent product capabilities. The second is the user's own ever-growing and changing business, the future of which may depend on the correctness of the buyer's decision.

Confused switch shoppers have put off buying decisions and left vendors banging their heads in frustration after a year of especially slow switch sales. According to a market study conducted by Dataquest, Inc., the San Diego-based research firm, the number of lines shipped for 1985 was close to 4.1 million. This figure is only slightly up from the 3.9 million lines shipped in 1984.

Because shelling out for a big-ticket item like a PBX usually defines a corporation's communications strategy, users are skittish about buying systems that may be headed down the path toward obsolescence. They are still unsure whether they want, or even need, to run voice and data over the same switch.

Despite the hype about integrated services, the vast majority of PBX customers buy digital systems because of their clean transmission quality and basic voice and network control features.

According to Paul Daubitz, a consultant with Associated Telemanagement, Inc., a Boston-based consulting firm, most users with wide-sweeping communications needs will probably end up with a combination of equipment: a PBX to handle voice and some data traffic such as electronic mail and a local network or digital data switch to transmit the bulk of data traffic. The products will be connected by gateways.

"The limited bandwidth of most PBXs on the market today — 56K to 64K bit/sec — prohibits many data applications," Daubitz says.

"For casual data transmission needs, this capacity may be fine, but any heavy data transmission will probably choke most systems," he adds.

Some applications, such as supporting heavy data traffic between computers and peripheral devices, are more suited to local-area networks. Moreover, some users may find it less expensive to buy a voice PBX and a separate data PBX rather than an integrated unit.

A PBX is usually preferable if the customer is in the market for greater flexibility with both wiring and positioning existing terminals.

Matching user needs

When selecting a switch, a customer's first concern should be matching application needs with products and features that are on the market — not price. Users have a choice of buying a system with either centralized or distributed architecture. Both come with their own benefits and drawbacks.

Edward Horrell, president of Mitchell and Horrell, Inc., a Memphis-based consulting firm, explains that the nodes on a system with distributed architecture can operate independently, even though the system itself operates as a whole. Users who opt for a centralized system either must buy a big processor and grow into it, or change from a small one as the company grows. "A distributed architecture's modularity is more conducive to growth," Horrell observes. "Buying a centralized architecture is usually a decision tied to capacity planning."

As far as extra features go, there is very little that distinguishes one PBX from another. Most big systems offer least-cost routing, call detail management, modem pooling and electronic mail capability.

☞ Continued on **page 66**

HIGH-END VOICE/DATA PBXs

	Maximum voice/data lines	Telephone sets supported	Maximum bit/ sec rate per port		System wiring (pairs)	Protocol support	V.35	Local-area net gateways	Trunk interfaces	Terminal Interfaces	Host interfaces
			asynchronous	synchronous							
AT&T Information Systems Morristown, N.J. System 85 Release II D3	32,000	digital, analog	64K	64K	2	SNA/SDLC bisynchronous	✓	using information systems network (ISN) can access most local nets including AT&T's 3B Net	DID3, DS1, DID	RS-232-C, RS-366, RS-449	DMI
GTE Communications Systems Phoenix, Ariz. Omni Series	50,000	analog	19.2K	64K	2	none	✓	none	DS1	RS-232-C	none
Intecom, Inc. Allen, Texas S-80	21,000	digital, analog	19.2K	56K (10M burst-rate mode)	2	X.25 bisynchronous SNA/SDLC	✓	Ethernet 3270 Coax Elimination	DS1	RS-232-C RS-449	none
Mitel Corp. Konata, Ont. SX 2000	5,376	analog	9.6K	19.2K	2-3	none		none	DS1, DID	RS-232-C	none
NEC Telephones, Inc. Melville, N.Y. Neax 2400	23,184	digital, analog	19.2K	56K	2	SNA/SDLC Ascii X.25	✓	Corvus Systems, Inc. Omninet	DS1, DID	RS-232-C RS-449	none
Northern Telecom, Inc. Richardson, Texas SL1, SL100	SL1, 5,000 SL100, 32,000	digital, analog	19.2K	56.K	1-3	X.25 bisynchronous SNA/SDLC system 36, 38 gateways	✓	Ethernet	DS1, DID	RS-232-C, RS-442, RS-422	CPI
Rolm Corp. Santa Clara, Calif. CBX II	20,000	digital, analog	19.2K	64K	1-4	X.25 SNA/SDLC bisynchronous	✓	802.5 Token Ring Ethernet, IBM's PC NET, 3270 Coax Elimination	DS1, DID, DID3	RS-232-C RS-422	CPI
Siemens Communications Systems Co. Iselin, N.J. Saturn II,III	Saturn II: 224, Saturn III: 992	digital, analog	19.2K	none	1	X.25		none	DS1, DID	RS-232-C	none

This chart represents a selection of vendors leading the high-end voice/data private branch exchange market. Many of the vendors listed here also manufacture other products.

From **page 65**

But there may be significant implementation differences. Remember that all switches do not upgrade data transmission capability in the same way. Putting data on the PBX impacts the traffic flow, and users may want to consider whether or not to increase the traffic capability of the switch.

> *“Depending on local tariffs, users can save by using high-speed T-1 circuits. However, switches differ in the way they support T-1 circuits. Some can support simultaneous voice and data over a single circuit, while others require separate circuits for the two types of traffic.”*

The following interplay represents a typical decision that many customers face. To achieve an essentially nonblocking environment that permits all calls to pass through the switch, many vendors use a fixed time slot on each port.

Ian Angus, president of Angus Telemarketing Group, a Toronto-based consulting firm, observes that the Rolm CBX II permits the user to submultiplex several low-speed data transmissions during a single time slot. On the Northern Telecom, Inc. SL1, however, every data transmission takes up one time slot.

“Not only does the SL1 have many more time slots, it can also add those slots easier than the CBX,” Angus notes.

“The software that facilitates the process of adding more time slot connections onto the Rolm CBX is expensive.

“The cost to add data capability to the CBX II can also range from a low of $500 up to $2,000,” Angus adds.

Vendors commonly describe their systems as totally, essentially or virtually nonblocking, but their definitions of the three terms are hazy at best.

Horrell describes a totally nonblocking switch as one that enables all users to access ports simultaneously.

“You either are nonblocking or you're not,” Horrell says. “This implies that the user has both the traffic and real-time capability needed to process all calls.”

PBXs also handle 3270 terminal emulation differently. Some use protocol converters or coaxial cable elimination switching systems like the Northern Telecom SL1 or SL100.

AT&T Information Systems uses a product called 3270 Data Module, which lets an IBM or compatible terminal go through the System 85 switch and connect to multiple hosts or cluster controllers.

Customers should also check for features they might take for granted, such as call transfer or call pickup. One system may allow an unlimited number of telephones in a pickup grouping, and some systems allow for no more than 50.

Gateways to T-1 trunks, X.25 packet switching networks and long-haul digital circuits are popular features.

Depending on local tariffs, users can save by using high-speed T-1 circuits. However, switches differ in the way they support T-1 circuits. Some can support simultaneous voice and data over a single circuit, while others require separate circuits for the two types of traffic.

Tandem switching

All PBXs offer the ability to make trunk connections to a distant PBX through the switching system.

This feature is commonly known as tandem switching, and each company uses a different network control system with varying levels of sophistication to handle the task. Incompatible standards become an increasing problem as a company adds locations and a larger variety of PBXs.

“AT&T [Information Systems]' Electronic Tandem Network, Northern [Telecom]'s Electronic Switch Network and Rolm [Corp.]'s Rolmnet may talk to each other, but have difficulty handling each other's subtle features,” Angus says.

All PBXs surveyed support one or more hosts to PBX interfaces that permit switching from local or remote terminals to a host computer. Northern Telecom and Digital Equipment Corp.'s codeveloped computer-to-PBX Interface (CPI) is one of the common interfaces. Digital Multiplexed Interface (DMI), the AT&T Information Systems specification, is another. Both interfaces support 64K bit/sec transmission over standard DS1 or 1.544M bit/sec, T-1 facilities.

Continued on **page 67**

NETWORK WORLD

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1 **My primary areas of activity.** Circle ONE only.

I am involved in evaluating communications (data, voice and /or image) products and services:

1. for *use within my* own company/organization
2. for *resale* to other companies/organizations
3. Both

1a **For communications, my primary responsibility is:** Circle ONE only.

1. Data Communications
2. Voice Communications
3. Both

2 **Circle only the ONE title classification which most applies to you.**

Company Management

11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management

Data Communications

21. Management
    VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
    Supervisor, Head : Networking, Design, Analysis, Engineering, R&D, Applications, Services

Telecommunications

31. Management
    VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks. Engineering, Design, R&D, Application Development
32. Supervisory/Staff
    Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services

Factory Communications

41. Management
42. Supervisory/Staff

MIS/Data Processing

51. Management
    VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others

75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other ____________________

3 **Job Function**

Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate

1. Business Management, Planning and/or Development

Communications System/Network

2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other ____________________

4 **Which one of the following best describes the primary business activity of your organization at this location?** Circle ONE only.

Consultants

11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users

13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors

41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other ____________________

5 **In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services?** Circle ALL that apply.

1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 **Check ALL that apply in columns A and B.**

A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:

B. These products and services are presently in use at this location:

	A	B	*Product/Services*
Computers			
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
Data Communications			
04.	☐	☐	Communications Processors
05.	☐	☐	Comm./Networks Software
06.	☐	☐	Digital Switching Equipment
07.	☐	☐	Facsimile
08.	☐	☐	Modems
09.	☐	☐	Multiplexers
10.	☐	☐	Protocol Converters
11.	☐	☐	Network Mgmt. & Control
12.	☐	☐	Test Equipment
13.	☐	☐	3270 Controllers
Telecommunications			
14.	☐	☐	PBXs
15.	☐	☐	Key Systems
16.	☐	☐	Central Office Equipment
17.	☐	☐	Integrated Voice/Data Terminals

	A	B	*Product/Services*
Transmission/Network Services Equipment			
18.	☐	☐	Microwave
19.	☐	☐	Satellite Earth Stations
20.	☐	☐	Local Area Networks
21.	☐	☐	Wide Area Networks
22.	☐	☐	Packet Switching Equipment
23.	☐	☐	Fiber Optic Equipment
Communications Services			
24.	☐	☐	Packet Switching Services
25.	☐	☐	Cellular Mobile Radio Services
26.	☐	☐	Electronic Mail
27.	☐	☐	Enhanced Services
28.	☐	☐	Centrex

7 **Estimated value of communications systems, equipment and services:**

A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.

B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

	A	B	
1.	☐	☐	Over 10 million
2.	☐	☐	$5-10 million
3.	☐	☐	$1-5 million
4.	☐	☐	$500,000-1 million
5.	☐	☐	$250,000-500,000
6.	☐	☐	$100,000-250,000
7.	☐	☐	$50,000-100,000
8.	☐	☐	Under 50,000
9.	☐	☐	Don't know

8 **Estimated gross annual revenues for your entire company/institution:**

Circle only ONE.

1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 **Estimated number of total employees at this location:**

Circle only ONE.

1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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From **page 66**

The larger the PBX installation, the more critical cabling becomes. Depending on the complexity of the installation, cabling costs can comprise up to 15% of the price of the entire system. The issue is even more critical when a user is wiring a new building. Most high-end PBX systems operate using two-pair, twisted-pair wiring.

Two types of system software

Users should be aware that there are essentially two types of system software. The first is the software that makes the switch operate. The second is the feature-oriented software that is not part of the call placing function of the switch. The latter is chosen based on necessary features and applications the user wishes to address.

Horrell explains that users should understand the efficiency of operating system software instead of simply comparing inherent PBX memory. "The fact that one system has 756K of memory and another has 2M bytes says nothing," he says. The first machine may be efficient and use only 40% of its memory for system software, and the other may use 90%.

Horrell also advises users to negotiate a maintenance agreement carefully and try to get the vendor to agree on a price based on a fixed, guaranteed cap like the consumer price index or a fixed inflation rate. Only the buyer should be able to cancel the contract for a period of time determined in the contract.

"If you get a price cap, but the vendor can cancel the maintenance contract, you've wasted your breath," says Horrell.

The contract should cover all software and hardware, including peripherals and maintenance updates, such as call accounting systems. No subcontracting should be allowed without the written permission of the buyer. In fact, the ideal contract might include specific remedies for the buyer, such as liquidated damages.

"Make sure everything is factored in together so there are no surprises," Horrell adds.

How long will the switch last?

There is no reason that the switch you buy today should not be physically fit for 20 years. But natural corporate expansion usually knocks the latest system out of place about every seven years. According to Angus, one of the biggest mistakes users make when purchasing a PBX is buying too small.

"Customers have to figure in routine growth, unexpected growth such as a merger and also the expansion of terminals, modems, data capability and new features," he says. "It sounds silly, but probably one of the better ways to predict a company's expansion is to ask your knowledgeable people for their widest growth estimates and double that figure."

If major expansion is inevitable, users should make the switch's expandability features a primary consideration when buying. Again, every switch on the market adopts a different method for its add-on capabilities.

For example, Angus observes that the NEC Corp. Neax 2400 grows in small modules and other switches require major infusions of software and hardware to grow past certain break points. One node on the Rolm CBX II handles about 400 telephones. But the next node requires another large cash infusion. "The user may have bought into a system that can expand to 10,000 lines, but must examine what it will cost to reach that level," Angus says.

On the other hand, the Rolm CBX II and the Northern Telecom SL1 have been sold for about 10 years. Many recent changes have taken place in software or in peripheral equipment rather than in the hardware. So changes in those two systems may only involve up to 20% of the cost of the switch.

No obsolescence guarantees

Vendors cannot guarantee that the switch a user buys today will not face obsolescence by the introduction of the vendor's next system. When the NEC Neax 2400 was introduced, it was completely new and incompatible with previous NEC switches. AT&T's System 85 was a complete departure from the old AT&T Dimension sytems.

Users assume they are safe if they buy from a company that is large and established, says Angus. But the PBX market is volatile, and there are no guarantees.

"There may be a higher comfort level when you buy from the world's largest corporation," he says, "But the world does not stand still.

"As Texaco's recent troubles proved, just because a company has lots of money does not necessarily mean you can stay in business." ☑

▶ PBX PRICING

Users call the shots in shrunken market

Competition is white-hot among the three private branch exchange market leaders, AT&T, Rolm Corp. and Northern Telecom, Inc., which together control approximately 60% of the market.

Ian Angus, president of the Toronto-based Angus Telemanagement Group, estimates that by 1990, the PBX market growth rate will have declined to 7%, a figure that will represent pure replacement.

Joint agreements with information processing vendors have enabled PBX sellers to provide add-on services. Without joint agreements, PBX vendors risk having their sole source of revenue become moves, adds and changes.

"PBX vendors get upset when I say they are not going to survive," Angus says. "Their product may be terrific, but they have to understand that this is not a moral issue. The high-end PBX market is very finite. At the small end, you have firms moving around and expanding. There are really only so many large systems to sell," he adds.

Greg Carlsted, an analyst with Dataquest, Inc., a San Jose, Calif.-based market research firm, says that 1985 was the year of the deepening price war. PBX vendors and distributors reported flat revenue.

"The user was a big winner from that perspective," he says. "It seems like a good time to buy PBXs."

Carlsted adds that recent price wars could drive the average end-user installed price per line down to $760, compared with the $1,000 price tag of 1983.

There is no such thing as a typical PBX installation or system configuration, so these figures are rough estimates.

Users are advised to be wary of published PBX pricing, since what is usually listed is a per-port or per-line cost that is based on a plain vanilla offering.

Assuming that most customers want more than a box and some wiring, they should be aware that a vendor's price quote represents only the basics.

The initial cost of a total PBX system may run as high as $10 million for a 10,000-line system, depending on the individual configuration and features ordered. Ideally, a final price-per-line figure should contain the whole system shebang, including installation costs, batteries for backup power, redundant processors, electronic telephone sets and other unbundled hardware and software.

Interconnect vendors often arrive at different price quotes for the same product simply by adding different features into the package.

Angus claims that per-line or per-port prices also depend on who issues the figures. Prices listed by a vendor in a trade magazine are often charged to a dealer or middleman — not the end user.

"A good basic assumption to make when evaluating a proposal," he says, "is to assume the vendor was unresponsive to your original [request for proposal]."

— *Margie Semilof*

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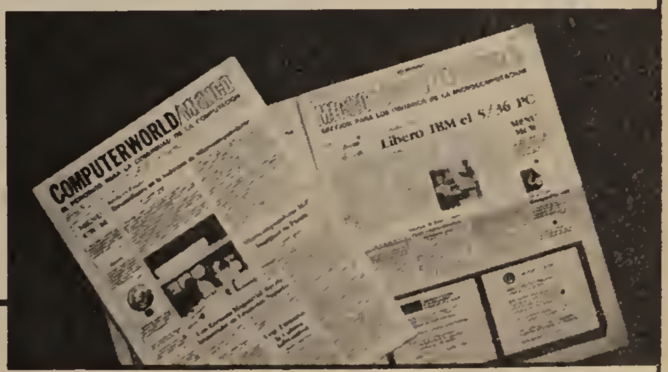

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X.25 services from **page 68**

The adoption of X.25 illustrates the growing interest in packet switching as a stepping stone to integrated services digital networks . "Build toward packet environments in preparation for ISDN," attendees were urged in a session on network optimization by Francis Dzubeck, president of Communications Network Architects, Inc., a Washington, D.C. consulting firm.

One highlight of the show was a joint demonstration of six interconnected public packet-switching networks. Coordinated by BellSouth Corp. Services, the central services company for Southern Bell Telephone and Telegraph Co. and South Central Telephone Co., the demonstration included AT&T Communications, MCI Communications Corp., Pacific Bell, Southern Bell and Southern New England Telephone Co. (Snet). Southern Bell used the demonstration to showcase Pulselink, a new packet service just approved by the Federal Communications Commission.

For the first time, the demonstration showed how regional packet services can be interconnected with long-haul carriers. An AT&T Accunet Packet Service connection provided a link from Pulselink to Snet's regional ConnNet packet service.

MCI's Datatransport network was used to interconnect two Pulselink networks contained within separate local access and transport areas and to link Pulselink to Pacific Bell's trial Public Packet-Switching service in California. MCI's Datatransport also was used to provide a connection to MCI's Impacs net, an international data service. Equipment used in the demonstration included Northern Telecom, Inc. packet switches and Amdahl Corp. access concentrators.

While not party to this demonstration, the more traditional packet-switching carriers were busy unveiling new services, all related to IBM protocols and products.

GTE Telenet Communications Corp. introduced a dial-up service capability for customers using IBM Synchronous Data Link Control and 3270 Binary Synchronous Communications protocols. The service is aimed at users that need two hours or less of connect time.

Archrival Tymnet/McDonnell Douglas Network Systems Co. countered GTE Telenet's release with the introduction of a protocol conversion service that enables users to access synchronous 3270 sessions using asynchronous Ascii terminals and personal computers.

Many private packet network products, intended for high-volume customers, were introduced. Most highlight network management.

BBN Communications Corp. introduced a color graphics workstation for net management and an artificial intelligence-based network design tool, Designnet.

Both the workstation and Designnet are sold as part of larger systems. Amdahl Corp.'s Communications Systems Division also endorsed net management with the release of its 4510 Network Processor and the Integrated Network Management, Administration and Control System (Inmacs). Bundled with the 4510 is a new F-1409 Node Management Unit, which provides local management and allows the processor to be managed remotely with Inmacs.

Vsat fom **page 5**

Vsats, satellite dishes ranging in diameter from 1.2 to 1.8 meters, are situated at a company's headquarters, for instance, and are used to beam data to a larger hub earth station. The hub station then transmits information to a satellite transponder that beams the data down to Vsats at geographically dispersed locations.

The majority of Vsat vendors offer units that operate in the Ku (11 to 14 GHz) satellite band. A smaller number of vendors peddle Vsats that use the C band (4 to 6 GHz).

Vendors claim their Vsat private nets offer several advantages over their prime competition — leased-line configurations. They are quick to mention that leased-line tariffs are in a constant state of flux.

Vsat vendors also claim the installation of a single leased line may require a wait of several months. Satellite technology offers users the ability to reach locations that may not be served by high-bandwidth data services.

A lack of familiarity with the technology is still a problem. "To most data communications users, Vsats are unknown quantities," Reutter claimed.

"And the price of admission to this technology can exceed a million dollars." Comsat markets both 1.2-meter and 1.6-meter Vsats in a package with a 6.1-meter hub earth station.

Tymnet/McDonnell Douglas Network Systems Co. of San Jose, Calif., offers a similar Vsat starter kit to interested communications users.

A user participating in the Tymstar Pilot Program makes a three-to-six-month commitment to the service.

Equatorial Communications Co. of Mountain View, Calif., offers users its Pilot Network Program. Under this agreement, a company may use three Vsats for up to 90 days.

Ray Fentriss, executive vice-president of the Stamford, Conn.-based Gartner Group, Inc., said user interest in Vsat pilot is high. "Users are looking for tests in which they can work with Vsats at two or three locations," he said.

Farmers from **page 1**

planning for Farmers, said the transition from a leased-line network to a Vsat network brought with it few unanticipated problems. "We are satisfied with the way things are going," Terhar explained.

"But we are especially excited about the dollar savings."

Communications cost savings per site, he said, depend on the location of the remote Farmers office. "We can save money on locations that are furthest from terrestrial facilities," he explained. Many of the company's remote locations could not be reached by terrestrial facilities.

Terhar said data sent in IBM's Synchronous Data Link Control (SDLC) mode over satellite has not been adversely affected by propogation delay.

Propogation delay is the amount of time involved in transmitting data to and from a satellite orbiting the earth.

Farmers' Vsat system currently connects roughly 1,000 agent offices and 115 branch claims offices in 26 states to Equatorial's master earth station in Mountain View. The master earth station is connected to three IBM mainframes in Farmers' data processing center in Los Angeles. The entire Vsat network was originally slated to be fully operational by mid-year, but will not be completed until year end.

The system is divided into two networks, one designed to serve agent offices and another to support the company's branch claims offices. Agents typically receive information about policyholders, including the customer's premium status.

Staff at a branch claims office request data on customer insurance coverage. Insurance claims are transmitted to the data base at the company's DP center. All information received at the center during daytime hours is stored. The corporate data base is then updated in the evening.

Terhar claims system response time has decreased markedly with the implementation of the Vsat network. Response time gradually increased to 15 seconds after divestiture, but the replacement of the leased lines with Vsats coupled with better net traffic management has trimmed response time an average of seven seconds.

Equatorial has supplanted several telephone companies as Farmers' network service vendor.

"If a problem is reported from one of our sites, we call Equatorial instead of the telephone company," Terhar explained. "They do the same troubleshooting that the telephone company used to do."

Terhar said Equatorial is like any other company when it comes to troubleshooting system problems. "Equatorial's service support is about the same as IBM's or as a telephone company's," he claimed. "Like any other service organization, Equatorial fares pretty well in major metropolitan areas, and they have difficulty with locations in outlying areas."

During the divestiture of AT&T, Farmers' network was growing quickly, but the supply of leased lines was not keeping pace with user demand for the facilities.

"We had agents with equipment that were screaming for service," Terhar recalled.

"The telephone companies at the time of the divestiture were quoting us six months for leased line installations, and they weren't meeting that. We couldn't wait six months."

Metro nets from **page 4**

These hierarchical metro networks reportedly can operate from 12M bit/sec to several hundred megabits per second. The lower speed is used for connecting workstations.

The mid-range speeds are used to tie together mainframes and private branch exchanges. The higher speeds are used for the network's backbone.

James F. Mollenauer, chairman of the IEEE's 802.6, or metro-area network committee, said he expected the metro network standard to be accepted by the IEEE this year. Companies such as AT&T, IBM and Burroughs Corp. are already testing such networks in their laboratories.

According to Dan Sze, vice-chairman of the 802.6 committee and director of networking for Burroughs, customers using the metro network will only require one wiring scheme.

"When building metro nets with fiber, we build a hierarchy of networks with similar architectures," Sze said.

"Ordinarily, when users migrate to another speed, they also must migrate the circuitry.

"With a metro net, the communications system is programmed so nothing has to change. Metro networks are an all-purpose plug in the wall."

Although metro-area networks are for private use, they are being built with the public integrated services digital network in mind. Metro network architects report that only slight circuitry alterations will be needed for users to interface with public networks.

For example, Sze explained that a metro network will use the 2B+D interface standard of the ISDN architecture.

However, metro networks' synchronous channels are dynamically reassignable and can be modified to whatever equipment the user wants to plug into the network. The data channel remains the same and can be routed into an ISDN connection.

"The metro-area network is intended to operate at a higher bandwidth than current ISDN channels, because we are moving real-time information," Sze said.

Both Mollenauer and Sze expect semiconductor manufacturers to debut chip sets for metro-area networks by the end of this year. They also expect AT&T and the Bell operating companies to lead the way in the provision of fiber wiring systems.

Biddle from **page 5**

International Standards Organization specifications or the actual tests run to see that a product conforms to the specifications?
It includes both of those elements. A test suite is a set of specifications to ensure that a company has included a set of ISO options.

In the OSI model, there are 20 to 100 options for each layer. MAP has chosen some; Technical and Office Protocol (TOP) has included similar options. Will COS also take a cut at the model?
MAP has agreed on a specific subset of those specifications and, to a degree, COS will do the same. In effect, COS vendors will agree to talk the same language at the interface level.

Will there be one COS model for financial applications and another for the factory?
We plan to focus on generic features, such as file transfer and management, naming and addressing, virtual terminals, printing and imaging. Upper levels dealing with form layout of a financial application will be left to the user. The COS model will simply allow him to move information through his net.

How will COS work with organizations such as the MAP and TOP users groups?
There will be close working relationships with these types of groups. COS will complement industry-specific efforts such as MAP/TOP. A number of key MAP players are COS members. MAP has focused solely on the factory floor. COS must ensure that the needs of the financial, transportation and other industries are represented in the standards organizations.

What will COS' relationship be with the International Standards Organization (ISO)?
COS will not work directly with ISO. Member companies will continue to send technical experts to particate in the volunteer standards committee, both domestically and internationally. COS' role would be to keep industry and top management informed.

The ISO committee rejected inclusion of IBM's LU 6.2 in the OSI model. Could the COS model include LU 6.2?
That judgment must be made on the merits of LU 6.2 and on the importance of keeping OSI an open architecture. I can't make a judgment on COS strategy there. My speculation is that COS would approach LU 6.2 in the same manner as the European Computer Manufacturers Association. LU 6.2 represents a compromise of the basic principles underlying the OSI model, namely, that specifications don't conform to one company's product line.

When would decisions like the one on LU 6.2 be made?
Work has been taking place since last September. The strategy forum is in place and is operating.

When will products with a COS sticker be available?
Our goal is to have File Transfer and Management 3.0 implemented in deliverable products in the first quarter of 1987. X.400 electronic messaging is scheduled for approximately the same time. The second set of products, consisting of document management, virtual terminal, network management and directory services, will be available in the first quarter of 1988. Shortly thereafter, COS will take up naming and addressing, document printing, common architecture through distributed applications, building wire, terminal management and integrated services digital network interconnections. ☑

Additional reporting by Washington, D.C. correspondent Karyl Scott.

OAC from **page 3**

as a general purpose workstation around which office systems are being developed.

Local-area networks can increase the productivity of work groups, he said, and emerging applications for network servers will provide users with many office functions currently hosted on mini- and mainframe computers. Technological changes are forcing a variety of management changes, several speakers noted.

As distributed processing systems emerge, personnel now involved in managing host computer resources will be dispersed to coordinate departmental systems, said George Colony, president of Forrester Research, Inc., Cambridge, Mass.

Communications expertise, rather than DP experience, will be in demand, Colony said.

Carol Ford, one of the more than 15,000 people who attended the conference, seems to exemplify the evolution of OA that is occurring in many organizations.

Ford once coordinated word processing activities at Occidental Petroleum Corp. in Los Angeles. But her responsibilities have grown to include communications. Ford's current title is manager of word processing and telecommunications. ☑

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April 3-4, Washington, D.C. — Integrated Services Digital Network Technologies and Applications. Also, June 3-4, Chicago. Contact: TeleStrategies, 1355 Beverly Road, McLean, Va. 22101.

April 7-11, San Francisco — Communications Week '86. Also, June 2-6, New York. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 8, Burlington, Mass. — Networking Personal Computers. Also, May 22, Framingham, Mass.; July 16, Lexington, Mass.; Aug. 19, Boston. Contact: Joan Merrick, Seminar Coordination Office, Suite 415, 850 Boylston St., Chestnut Hill, Mass. 02167.

April 8-11, Chicago — Data Communications: Components, Systems and Networks. Also, April 15-18, Los Angeles; May 6-9, New York; May 20-23, Washington, D.C. Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

April 9-11, Minneapolis — Local-Area Networks. Also, May 7-9, Los Angeles; June 4-6, Washington, D.C.; June 11-13, San Francisco; June 16-18, Denver. Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

April 14-16, Los Angeles — Managing Telecommunications for Better Service & Reduced Cost. Also, May 19-21, New York. Contact: American Management Association, 135 West 50th St., New York, N.Y. 10020.

April 14-17, Washington, D.C. — National Data Base & 4th Generation Language Symposium. Also, June 9-12, New York. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

April 16-18, Los Angeles — Local-Area Networks — A Planning/Implementation Guide. Also, April 21-23, Indianapolis; May 5-7, Philadelphia; May 14-16, Boston. Contact: Center for Advanced Professional Education, Suite 110, 1820 East Garry St., Santa Ana, Calif. 92705.

April 16-18, New York — X.25 and Packet-Switching Networks. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

April 24-25, Los Angeles — Capitalizing on Telecommunications. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

April 30-May 2, Boston — Introduction to Data Communications. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

May 2, San Diego — Project Management and Understanding Integrated Services Digital Networks. Contact: John-David Hughes, Home Federal Savings & Loan, 5545 Morehouse Drive, San Diego, Calif. 92123.

May 4-7, Tampa, Fla. — International Data Corporation 1986 Executive Spring Conference. The Impact of Emerging Technologies: New Horizons for Information Management. Contact: International Data Corporation, 5 Speen St., Framingham, Mass. 01701.

May 5-6, Washington, D.C. — Satellite Technology for the Nontechnical Manager. Also, May 8-9, Boston; May 20-21, Chicago. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 5-8, Sunnyvale, Calif. — Small Computer System Interface (SCSI). Contact: Technology Forums, Suite F, 3425 Pomona Blvd., Pomona, Calif. 91768.

May 6-8, Monroeville, Pa. — Telecom '86. Contact: Jack Foley, The Trade Show Group, 940 Western Ave., Pittsburgh, Pa. 15233.

May 7, Dedham, Mass. — Satellite Communications Systems. Contact: Northeastern University, State-of-the-Art Engineering, Spring 1986 Technical Seminar Series, 370 Common St., Dedham, Mass. 02026.

May 8, Dedham, Mass. — Optical Fiber Communications Systems. Contact: Northeastern University, State-of-the-Art Engineering, Spring 1986 Technical Seminar Series, 370 Common St., Dedham, Mass. 02026.

May 8-9, Washington, D.C. — First Annual Mobile Phone Conference: Winning Strategies and New Opportunities. Contact: Rose Hill, Conference Registrar, Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 12-16, San Diego — Comprehensive Course in Data Communications. Also, June 2-6, Boston. Contact: Susan Boettcher, Data Communications, The Special Projects Conference Management Center, c/o Information Breakthroughs, Inc., 445 West Main St., Wyckoff, N.J. 07481.

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Fortune	21-54	
Hayes Microcomputer	73	04
Micom	20 & 55	
Mitron Systems	12	
NEC	19	03
Network Management Technical Control	16	
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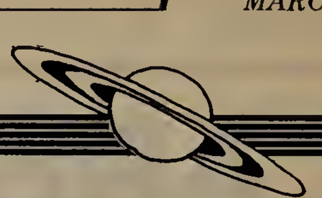
HORRELLSCOPES

BY EDWARD HORRELL



In communications today, it takes more than just good business sense to survive: It takes celestial guidance.

Libra: The scales are tipped against shared tenant services for users.

The idea had a lot of merit for major office building tenants who didn't want to fool with installing their own communications networks. But it's turning out to be an astrological risk for companies and developers that join together for shared tenant services without lining up their planets first.

Tenants whose communications networks are owned by the landlord must ensure that networking expertise is going to be available when they need it. Major users considering an office building with shared tenant services need to draw up detailed contractual agreements — and finalize them — before relying on the system. The key word here is "detailed."

What many users don't understand is the instability in the shared tenant services business.

Initially, the marriage of communications vendors and developers to offer services to prospective office tenants seemed like a match made in heaven. Investors expected to reap major awards in three to seven years. Crystal ball gazers took it as a sign of how big shared tenant services were getting when United Technologies Corp. (UTC) and AT&T, two giant constellations, wanted a piece of the action.

To everyone's surprise, UTC and AT&T formed a partnership. But they were star-crossed lovers from the outset. Both were competitors in telecommunications; neither was an office builder or developer.

Biologically, the union of two creatures of the same gender produces nothing, which is virtually what happened with the union of UTC and AT&T. ShareTech, Inc. was born in October 1984 and did nothing.

The first sign the marriage was cracking came from UTC. The corporate giant sold its communications subsidiary to Telex Corp. — an odd move for a company claiming commitments to communications. Now ShareTech is gone.

In Canada, a similar conjunction occurred: Olympia & York, a major developer active in the U.S., linked its fate with a telecommunications vendor in shared tenant services. Their enterprise, Olympianet, faded away quietly.

It doesn't take a stargazer to divine why these mergers failed: Shared tenant services are also shared information and expertise. Companies that develop such services should seek partners among communications specialists.

Despite all these problems, the idea of shared tenant services continues to attract profit-seekers. Mark L. Wolsky, manager of special publications for Telestrategies, Inc., says that more than 92 million square feet of office space was intelligent by November 1985.

On Wolsky's list of big players in shared tenant services are the ever-popular Bell operating companies. This surprises no one, since local telephone companies see their stars ascending in every imaginable constellation. Wolsky sees other ascendant stars on the shared tenant services horizon, including AT&T, IBM, Wang Laboratories, Inc. and DataPoint Corp.

Gemini: The sign of two faces. Two minds only begin to show the confusion at DataPoint.

That company can't even make up its corporate cranium whether or not it's in the private branch exchange market.

First DataPoint had a PBX; then it didn't; then it had it again; then it sold it. Who would trust a buildingwide network to a company that can't decide whether or not to stay with a communications system that stands alone?

Cosmic catastrophe of the month.

Dashing far ahead of other contenders for this month's honor is the merger of Big Loser GTE Sprint Communications Corp. and Smaller Loser US Telecom, Inc.

With the partners' management philosophies galaxies apart, the merger is a curious move indeed, unless everyone just wanted to consolidate their losses before pulling out.

Big Loser's parent announced earlier this month that it ran a $1.58 billion loss. Since this is the largest loss in the history of communications, it's conceivable stockholders had more to say to the parent than "Gee, GTE!"

Scorpio: The sting goes to any user who forgets to pull the plug.

The most valuable space today is not in the sky, but inside walls and floors. And it is becoming fairly common for unhappy customers to discover they're lacking adequate conduit space.

Worse, their wires are getting crossed — literally, in some cases — because their old communications firm, usually the operating company, didn't pull the cables from the conduit.

Often, that means there is no room for new cable or, if the space is there, that the old cable can interfere with the new.

Worse yet, vendors don't have policies covering what happens when the new system is damaged while the old cable is being removed. It's just such oversights that put customers into orbit.

Before signing any telephone system contract, users should know:

- Who owns the old cable;
- Who's going to pull it out;
- When;
- How much it will cost;
- And, most importantly, who bears the liability if pulling the cable causes problems with the new cable or system.

Nobody has so far given any thought to the problem of pulling the plug — except the customers who just got stung.

Sagittarius: A reasonable, sagacious sign rules over Rolm Corp. in California, land of fruits and nuts.

The free spirits at Rolm, now IBM's Rolm, were brought down when its president and founder, Ken Oshman, resigned.

"Dad just left home," one high-level company insider sighed.

Oshman was a laid-back administrator in the land that invented the term. He was the kind of president who got the best out of his people, and he knew most of the employees by name. The result was a creative organization that produced: Rolm is a major provider of PBXs.

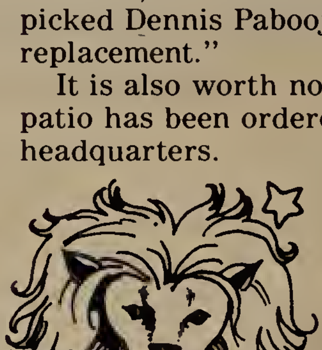
Now that Rolm is part of IBM — one of the most conservative constellations in the business universe — speculation continues as to what changes will develop. The new president of Rolm is Dennis Paboojian, who comes from the operations side of the company. He brings a completely different management style. Paboojian got off to a very aggressive start and nearly blew away his employees. But now he seems to be tempering his desire for immediate respect and recognition with an understanding that Rolm wasn't built in a day.

"He's learning to walk through the china shop without hurting a lot of stuff," one Rolmie said. "His job before was to charge through."

So those who are expecting the basketball courts and patios in Santa Clara, Calif., to be replaced by boardrooms and meeting facilities may be disappointed. Likewise for those who expect the orange cabinet to come out blue and the Rolmbus 295 to die a sudden death.

"After all the good things Ken Oshman did for this company, his last act was right, as usual," one Rolm employee said. "He picked Dennis Paboojian as his replacement."

It is also worth noting that an additional patio has been ordered for Rolm headquarters.



Leo: AT&T Information Systems, marketers of communications equipment, must be getting a lion's share of the business.

Simple equipment delivery for telephone sets and boards now takes weeks or months. AT&T spokesmen say orders are high, but really, nobody is *that* good. Chances are there's a manufacturing problem. Until AT&T gets that straightened out, users with immediate needs should reach out and touch somebody else.

Horrell is president of Mitchell & Horrell, Inc., Memphis, Tenn.

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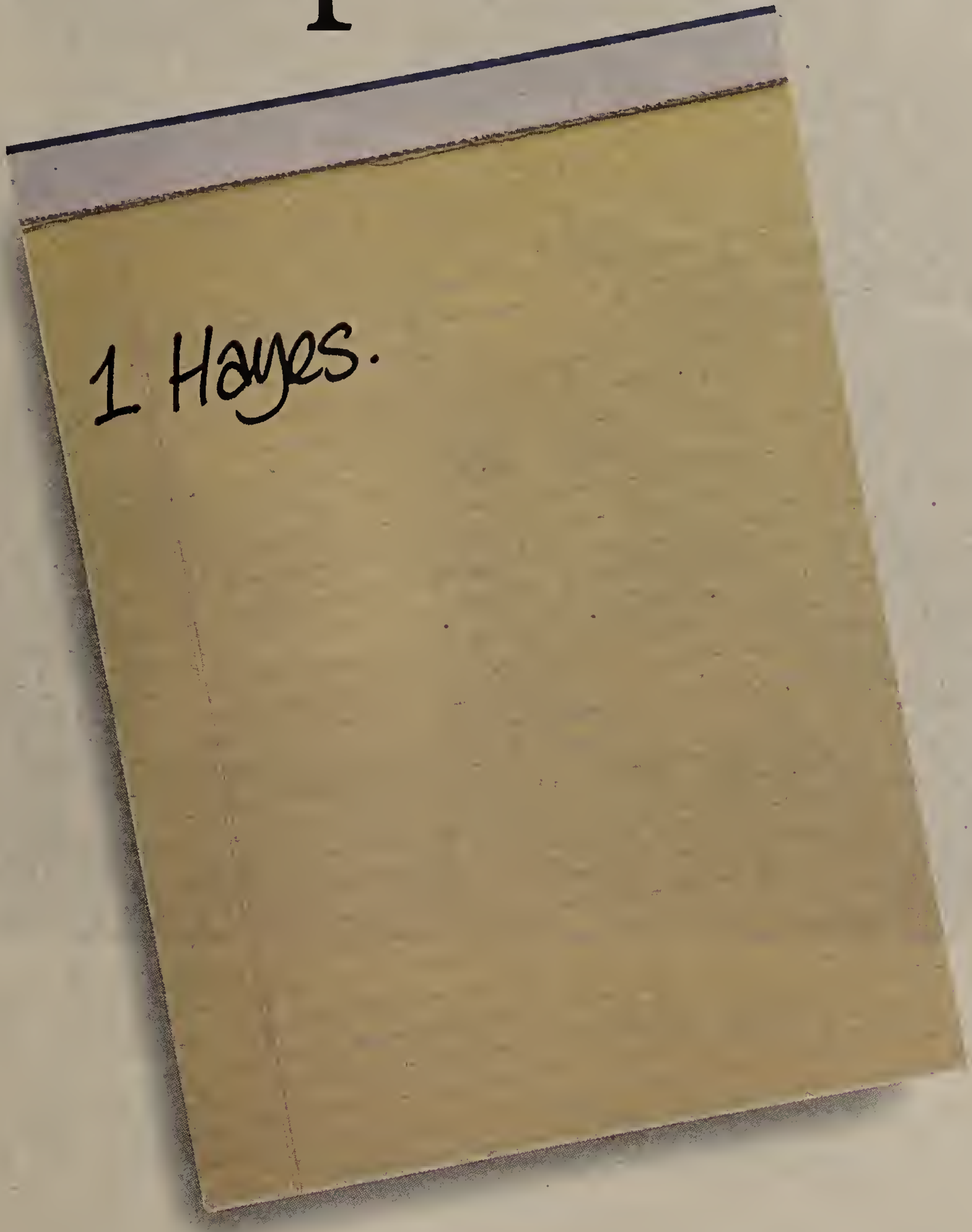
A complete list of things to know about 2400 bps modems.



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2. Through synchronous/asynchronous technologies, the Smartmodem 2400 permits your PC to access mainframes, minis, and on-line services previously inaccessible through asynchronous-only modems.

3. The Hayes Smartmodem 2400 is efficient...it pays for itself in just 4 hours of annual use over long distance.

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